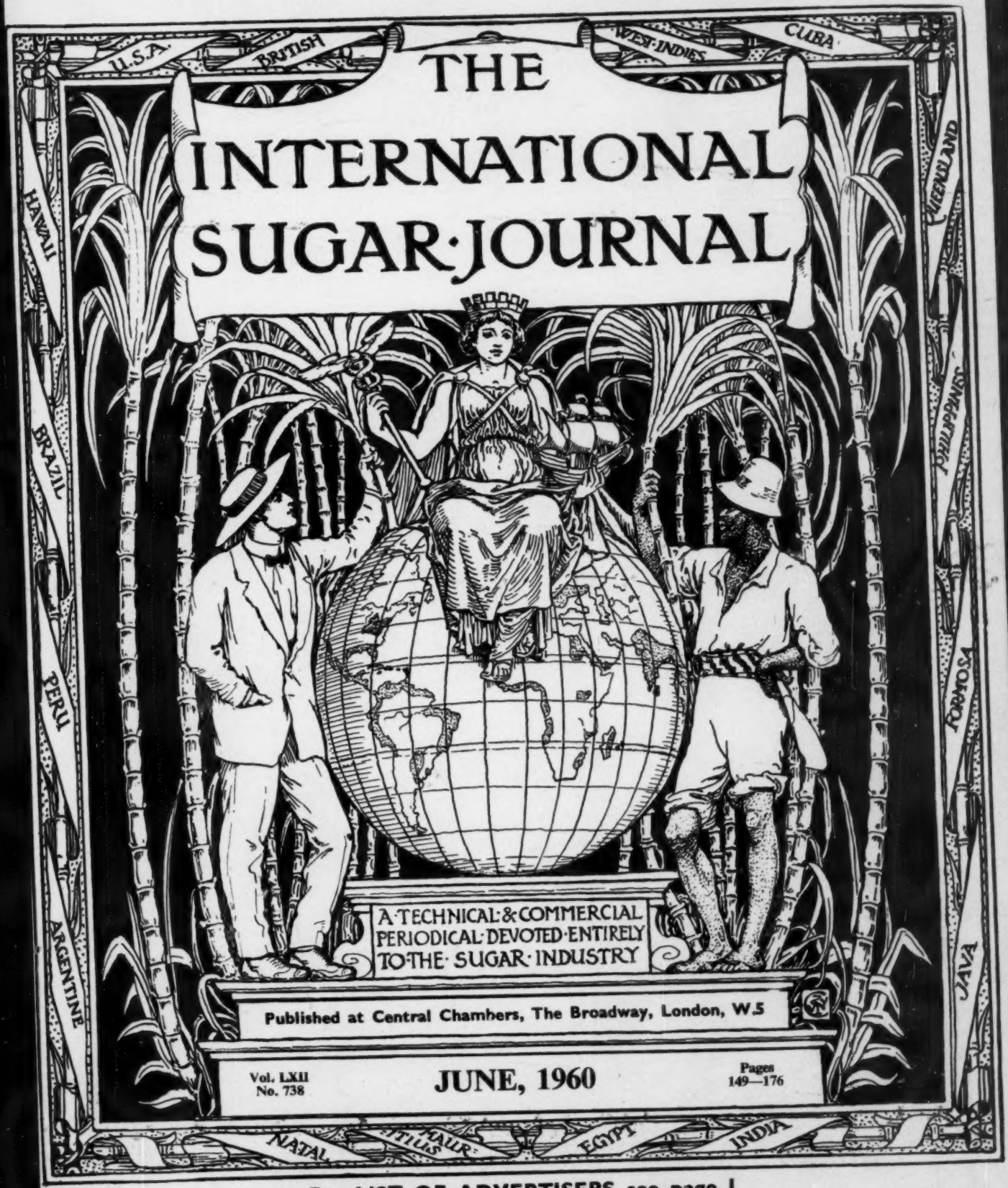
2s 6d or 45 cents net
Annual Subscription £1 12s or $5·00 Post Free



THE INTERNATIONAL SUGAR·JOURNAL

A·TECHNICAL·&·COMMERCIAL PERIODICAL·DEVOTED·ENTIRELY TO·THE·SUGAR·INDUSTRY

Published at Central Chambers, The Broadway, London, W.5

Vol. LXII
No. 738

JUNE, 1960

Pages
149—176

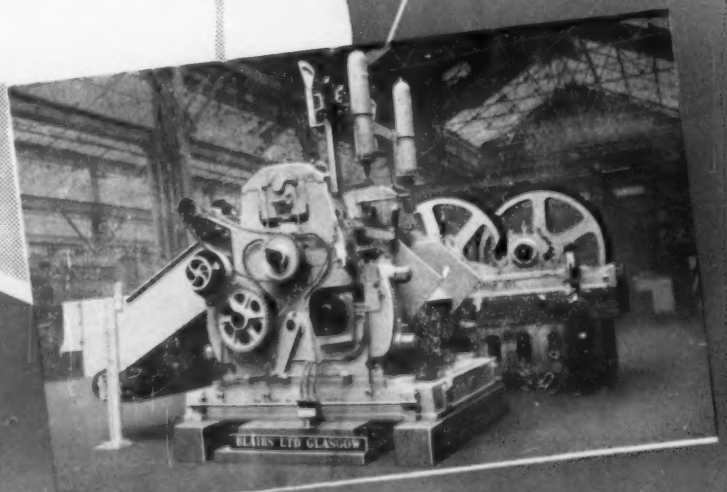
For LIST OF ADVERTISERS see page I

1857

This Mill is one of the many 3-roller water-powered Sugar Mills installed in Venezuela during the nineteenth century. It was supplied by us in 1857. It is upon the effective operation of such mills that the present Venezuelan Sugar Industry is founded.

BLAIRS MACHINERY SPANS A CENTURY

A modern Cane Mill based on the experience gained in the design and operation of such mills for more than 100 years.

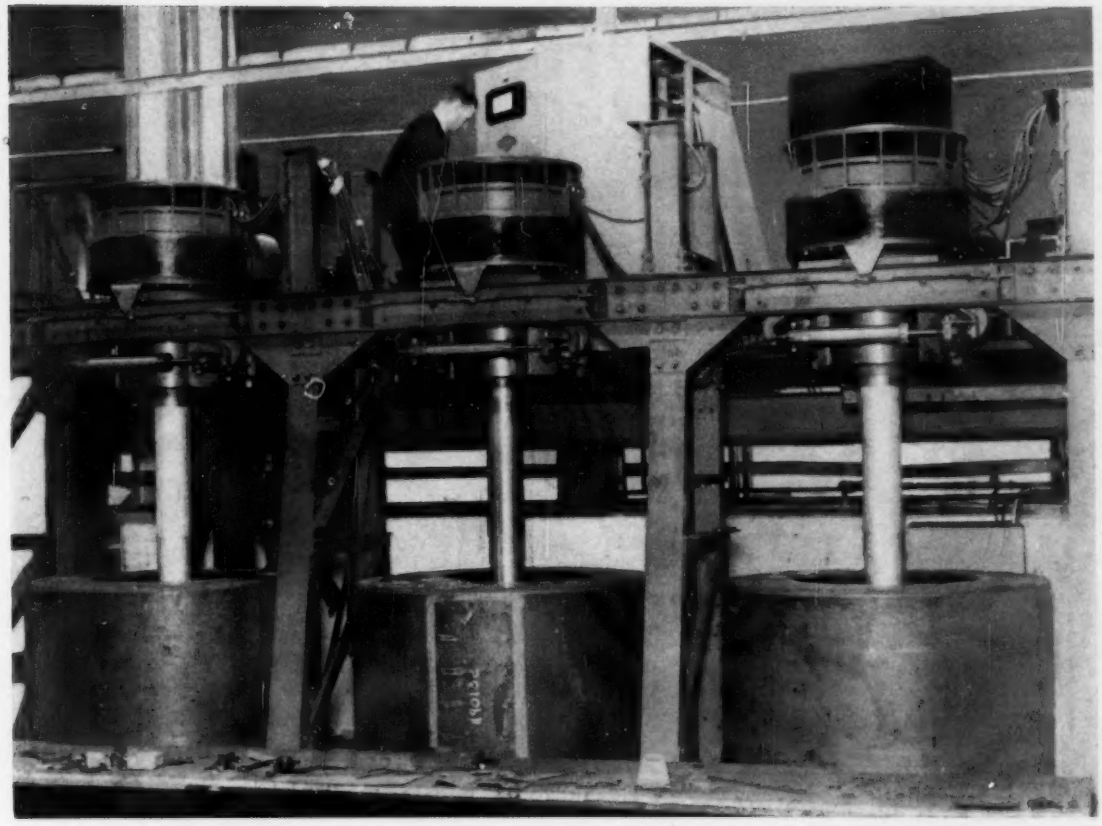


1957

COMPLETE SUGAR FACTORIES AND REFINERIES
DISTILLERIES, ABSOLUTE ALCOHOL AND CHEMICAL PLANTS

BLAIRS LIMITED
(ESTABLISHED 1838)

WOODVILLE STREET, GLASGOW, S.W.1
Cables: "Blazon, Glasgow"
London Office: 33 GROSVENOR GARDENS, S.W.1
Cables: "Multivap, Sowest, London"



FOR TAIWAN . . .

the first three of sixty 48″ × 30″ 1,200 RPM centrifugals for the Taiwan Sugar Corporation, photographed during motor and control gear tests at our works.

The centrifugals will be installed at the 'Towliu' factory, in supporting structure manufactured in Taiwan to our drawings.

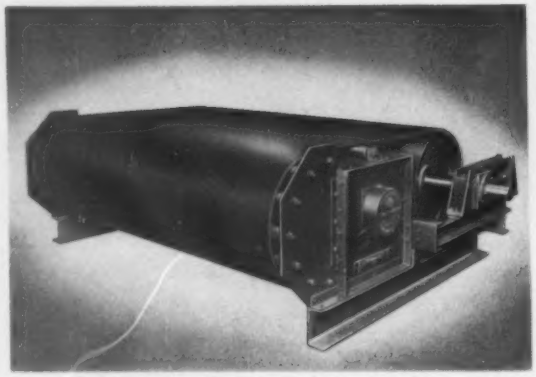
BROADBENT

THOMAS BROADBENT & SONS LTD . CENTRAL IRONWORKS . HUDDERSFIELD . ENGLAND

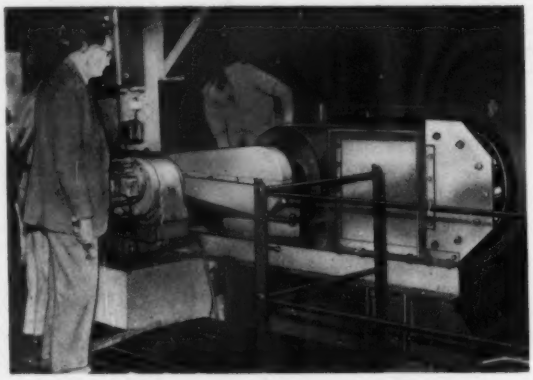
The World's largest manufacturer concentrating entirely on industrial centrifugals

Telephone 5520-5 *Telegrams: BROADBENT HUDDERSFIELD*

MAGNETIC CONVEYOR HEAD



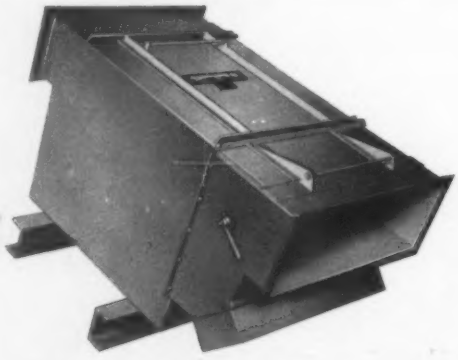
Boxmag patent MH. 2484. Conveyor Head built into an 84" wide short belt conveyor, photographed prior to despatch. The machine is designed for installation, as shown on the adjacent illustration.



Boxmag patent MH. 2484 installed in the chute between a sugar cane carrier and crusher, at a factory in Mauritius. It is designed to remove tramp metal automatically and continuously without an operator's attention. (write for leaflet 62/2).

MAGNETIC SEPARATORS PROTECT MACHINERY AND PRODUCTS

(Write for further details)



Boxmag Superflux Magnetic Chute for removal of ferrous contamination from refined sugar to decontaminate the product.

A Boxmag Unimajor block type Permanent Magnet. One of the many types of separators suitable for general applications in sugar factories. (write for details of full range).

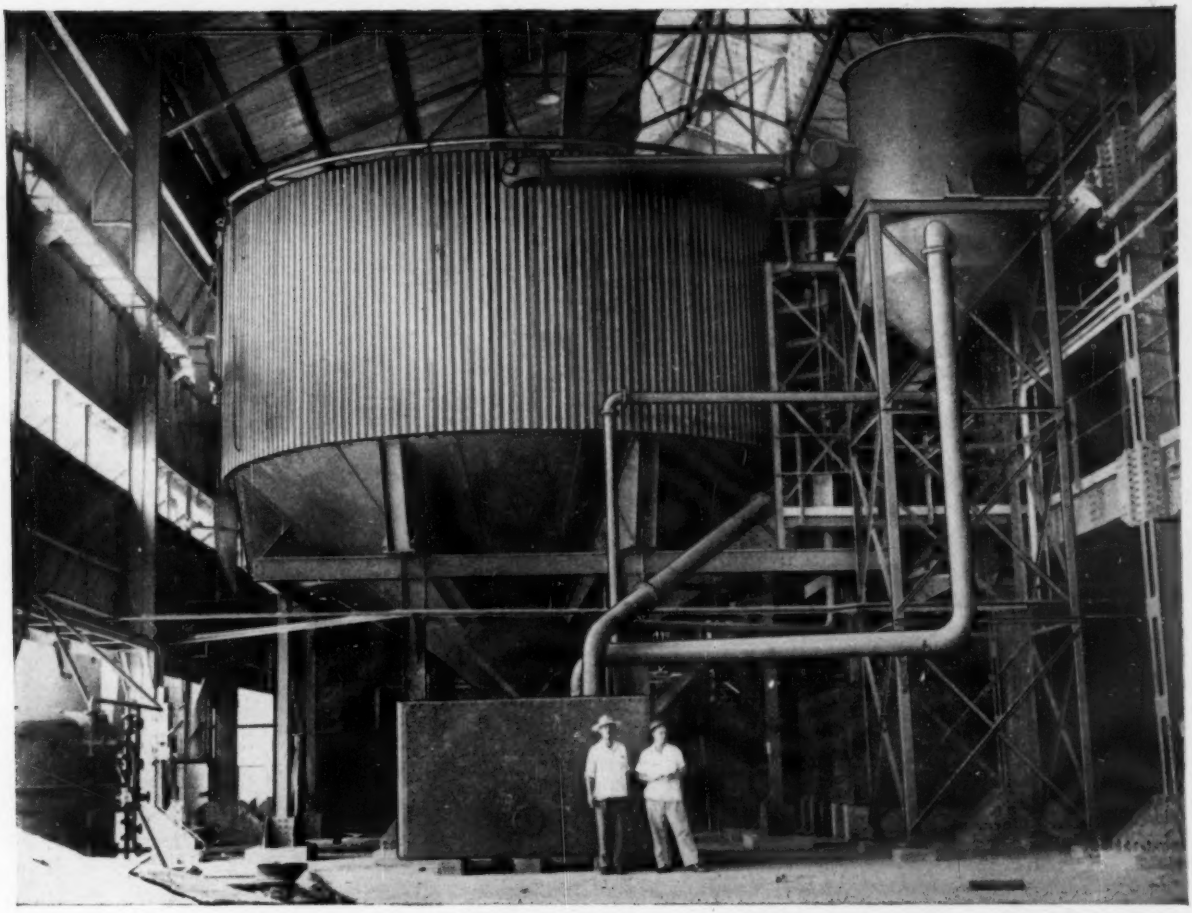
BOXMAG

Telephone
Central 5391

Telegrams :
Boxmag Birmingham

ELECTROMAGNETS LTD

BOXMAG WORKS • BOND ST. • HOCKLEY • BIRMINGHAM 19 • ENGLAND



'Mirrlees'

BACH CONTINUOUS SUBSIDERS

Illustrated is one of our most recent installations, a 30 feet, 5 tray Subsider in operation in Venezuela.

This Subsider enables juice to be drawn off at 5 points of optimum clarity. Surface evaporation is obviated, no surface scum enters the tank, and a high temperature is maintained throughout the apparatus.

SEALED 'Mirrlees' 'Bach' CLARIFICATION

The MIRRLEES WATSON COMPANY LIMITED

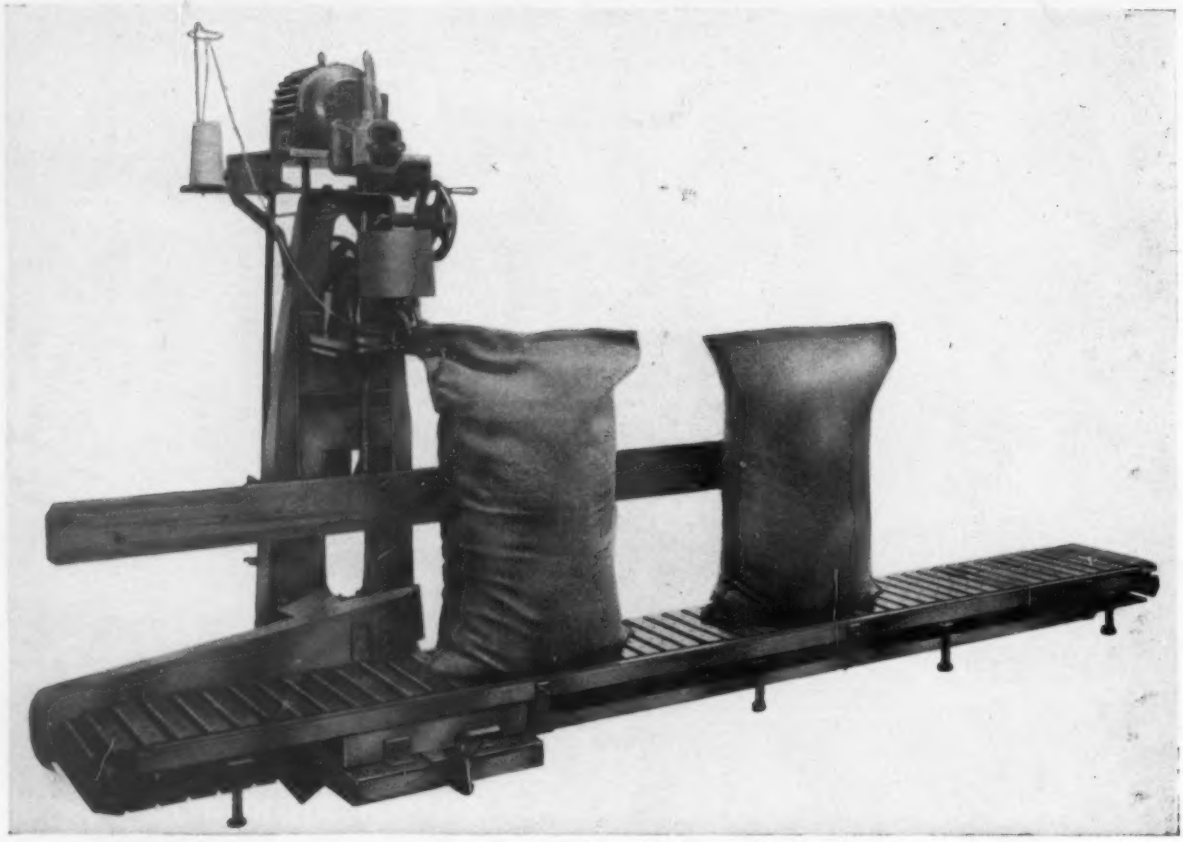
SCOTLAND STREET GLASGOW, C.5

London Office: 38 GROSVENOR GARDENS, S.W.1

The 'Super' Universal Sack Closing Machine

MODEL NO. 5B

Fitted with 10 or 12 ft. Conveyor and Special Clutch Drive



This machine is fitted with a conveyor 10 or 12 ft. overall and a Special Clutch Drive which allows the conveyor to be run independently of the sewing head.

Jute, Hessian, Paper Lined Hessian, Cotton and Paper Sacks weighing from 50 to 325 lbs. can be sewn on this machine.

Machines can be seen working by appointment.

Power required 2 h.p. *Shipping weight : 14 cwts.*

Manufactured in Great Britain by :

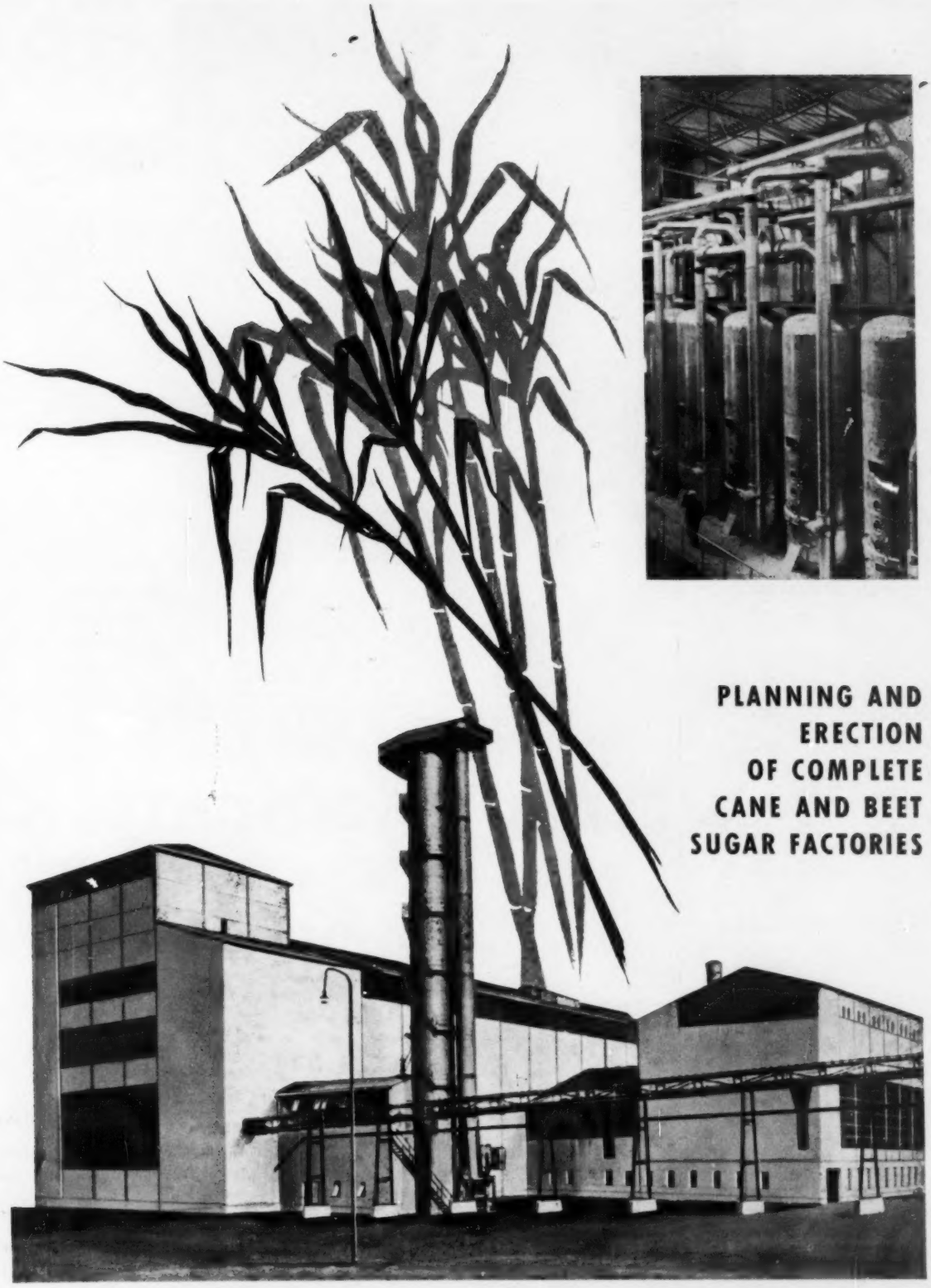
The Sack Filling & Sewing Machine Syndicate Limited

(Timewell's Patent)

TIMEWELL WORKS · LOCKFIELD AVENUE · BRIMSDOWN · ENFIELD . MIDDX.

Telephone : HOWARD 1188 *Telegrams :* FECIT, ENFIELD

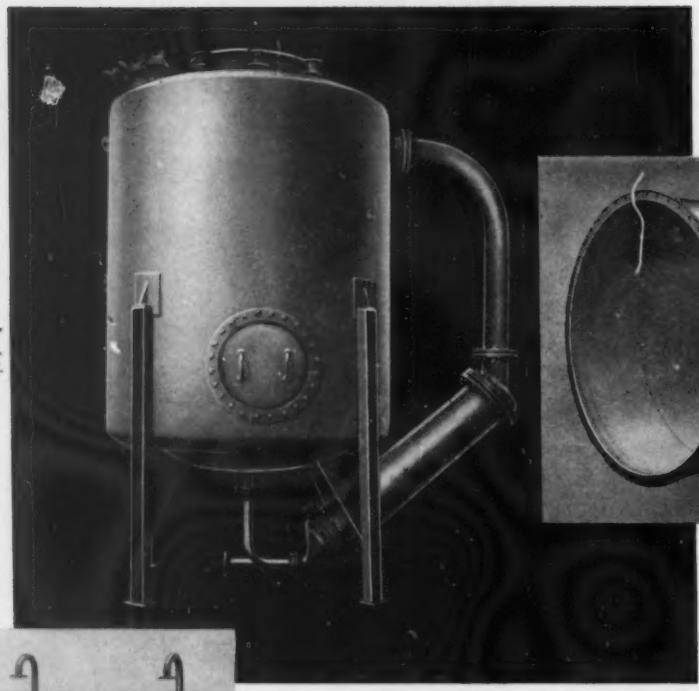
PLANNING AND ERECTION OF COMPLETE CANE AND BEET SUGAR FACTORIES



SALZGITTER INDUSTRIEBAU-GESELLSCHAFT M.B.H.

VORMALS: DEUTSCHE BERGWERKS- UND HUTTENBAU GESELLSCHAFT M. B. H.

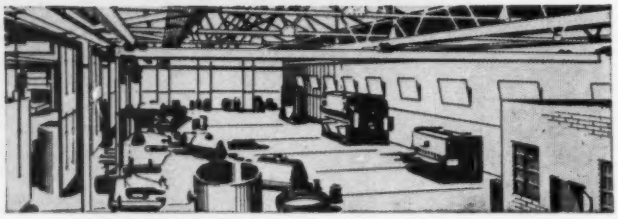
SALZGITTER-DRÜTTE / WESTERN GERMANY



1,000 gall. kettle in ¼" copper. Lynx Quasi-arc welded.

Stainless steel vessel with mild steel jacket

12,000 gallon water separator



WELDED FABRICATIONS

ORDINARY OR EXTRAORDINARY

CLARKS CAN COPE

STAINLESS STEEL, MILD STEEL, ALUMINIUM FABRICATIONS COMPLETE WITH VALVEWORK AND PIPEWORK

METALLIC ARC WELDING

ARGONAUT AND ARGON-ARC WELDING

STRESS-RELIEVING AND TESTING FACILITIES

Clark's modern methods, efficient equipment, unique facilities and practical approach all operate to your advantage....

Clarks offer you a unique combination of the most advanced equipment and methods with a century-old reputation for high craftsman standards on every type of fabrication work.

Stainless steel, mild steel, aluminium, copper or aluminium-bronze . . . Clarks of Hull will not only give you the practical solution to your problem—they'll deliver a first-class job on time !

Send that enquiry *first* to Clarks of Hull.

CLARK

GEORGE CLARK & SONS (HULL) LIMITED
HAWTHORN AVENUE, HULL

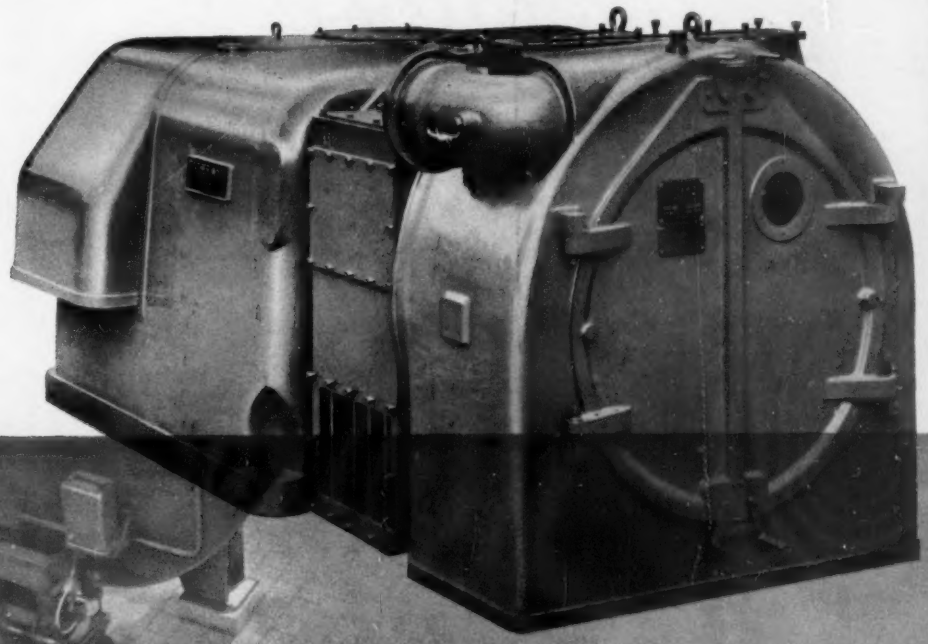
Telephone 37654 Telegrams 'Clark Hull'

A MEMBER OF THE NEWMAN HENDER GROUP

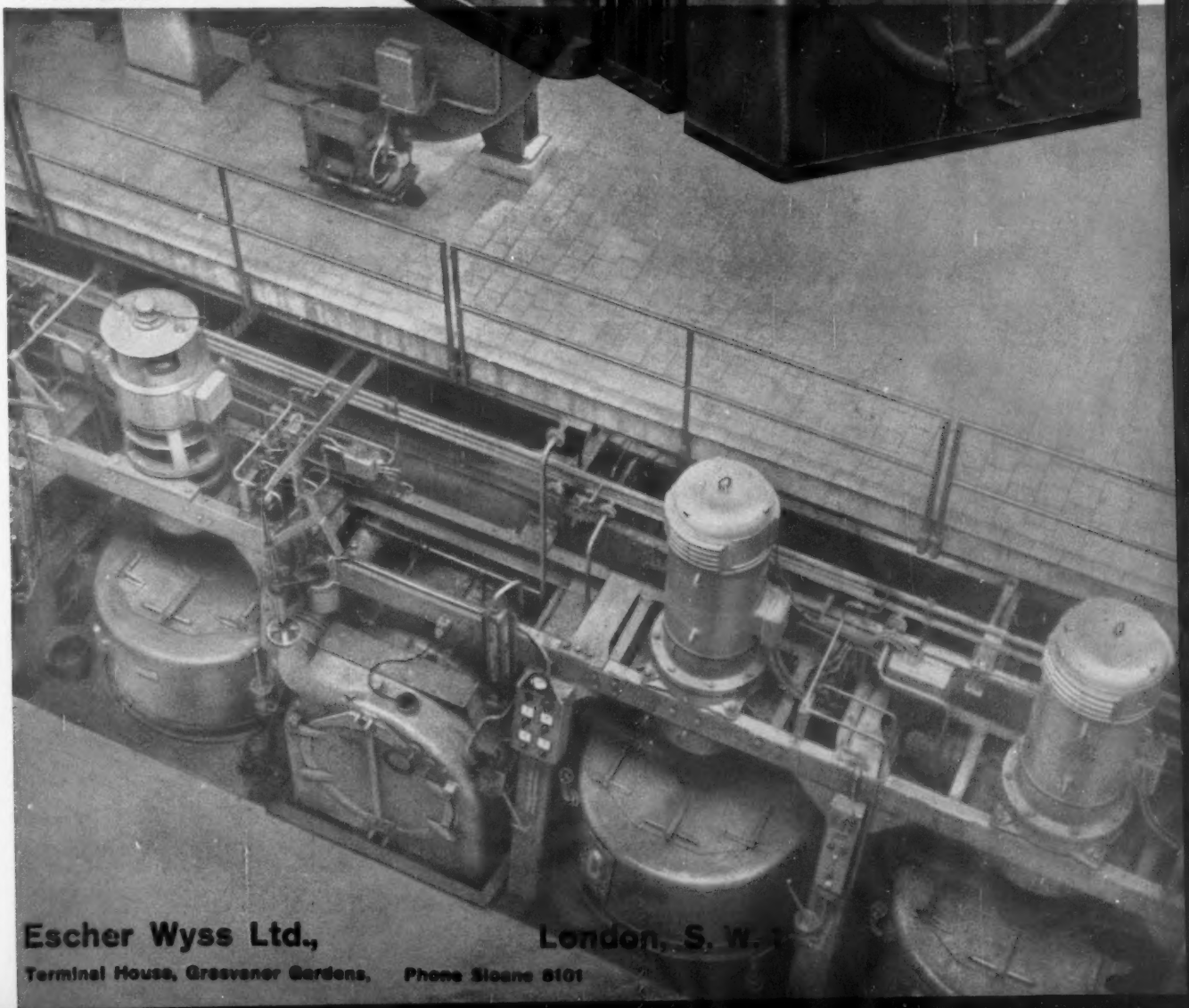
ESCHER WYSS

continuous centrifuges for the sugar industry

These centrifuges are in operation at Sugar Factories throughout the world.



Escher Wyss Centrifuge as replacement in a battery of vertical machines.



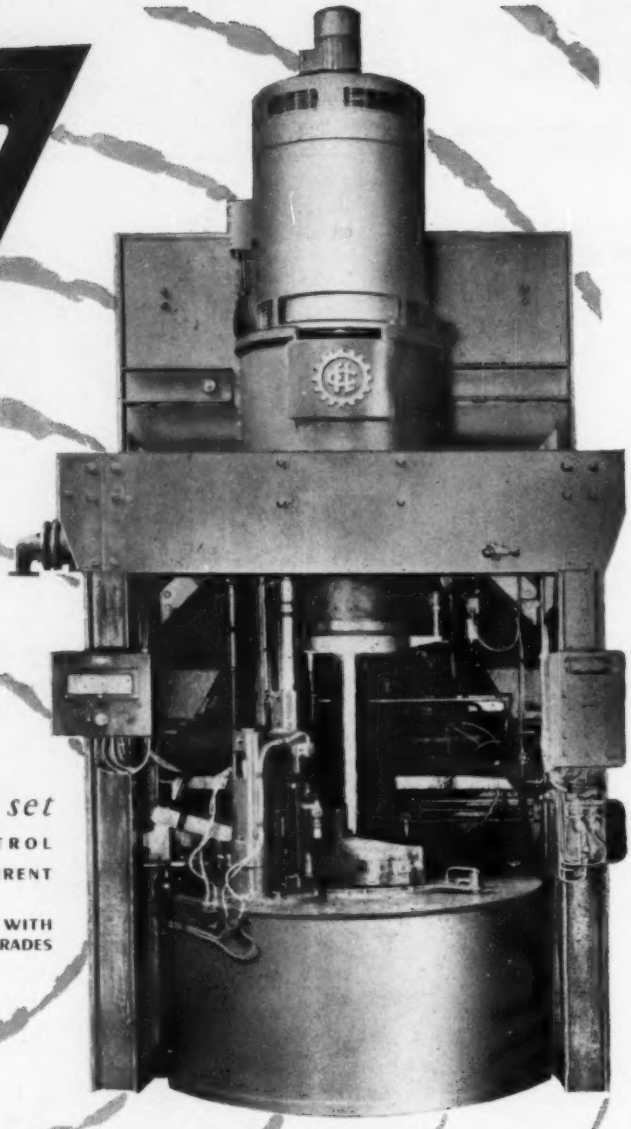
Escher Wyss Ltd., **London, S. W.**

Terminal House, Grosvenor Gardens. **Phone Sloane 6101**

Fully automatic!

the new

CENTRIFUGAL



driven by
WARD-LEONARD *set*

- ELECTRONIC CONTROL
- ELIMINATION OF CURRENT PEAKS
- RECORD PRODUCTION WITH MASSECUITES OF ALL GRADES

Battery of 4 centrifugals at the Fontaine-le-Dun Sugar Factory (France)

S.A.G. - PARIS

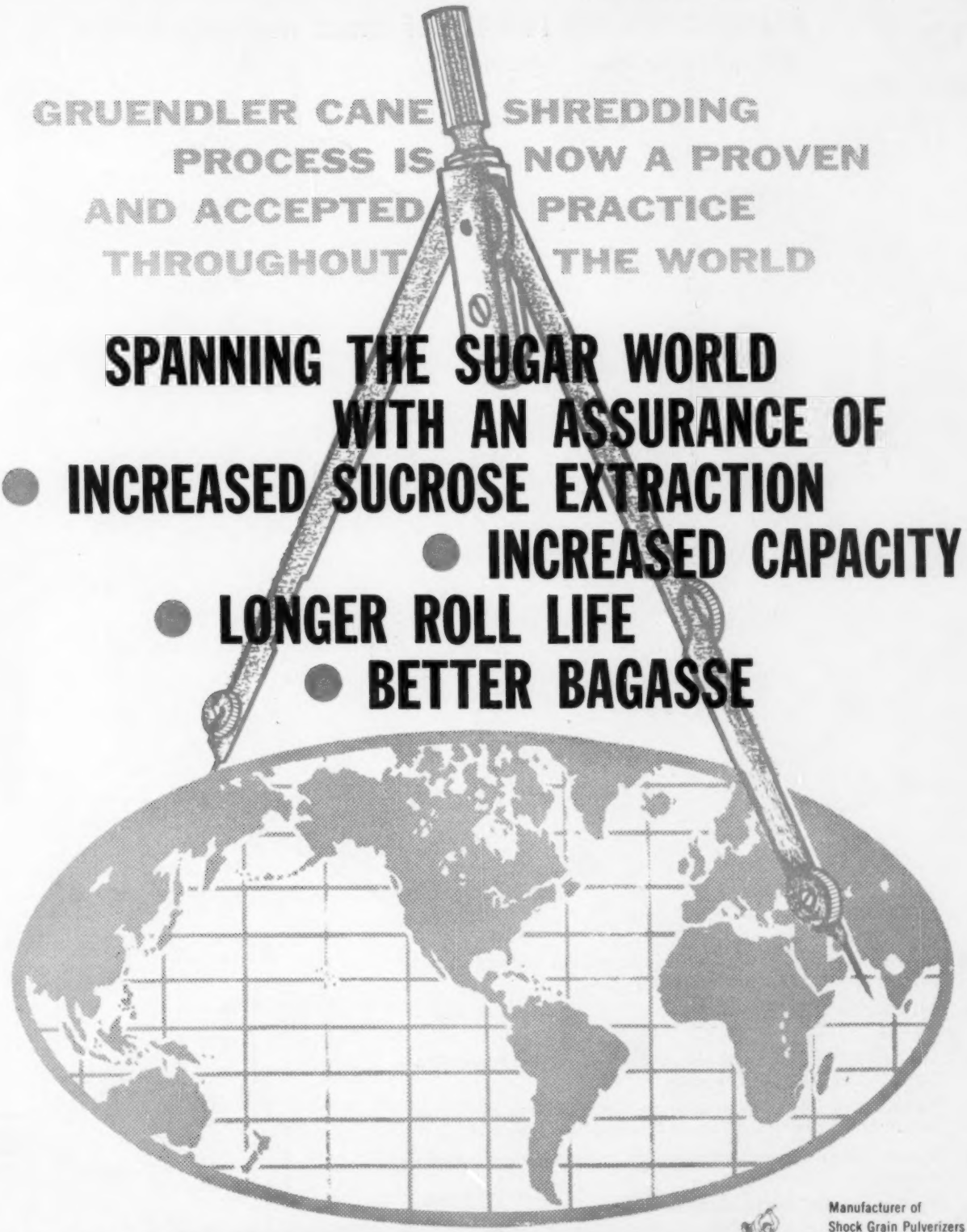
FIVES LILLE - CAIL

7, rue Montalivet, PARIS (8e) - Tél.: ANJou 22-01 et 32-40

GRUENDLER CANE SHREDDING PROCESS IS NOW A PROVEN AND ACCEPTED PRACTICE THROUGHOUT THE WORLD

SPANNING THE SUGAR WORLD WITH AN ASSURANCE OF

- INCREASED SUCROSE EXTRACTION
- INCREASED CAPACITY
- LONGER ROLL LIFE
- BETTER BAGASSE



GRUENDLER CRUSHER & PULVERIZER CO.

Established 1885

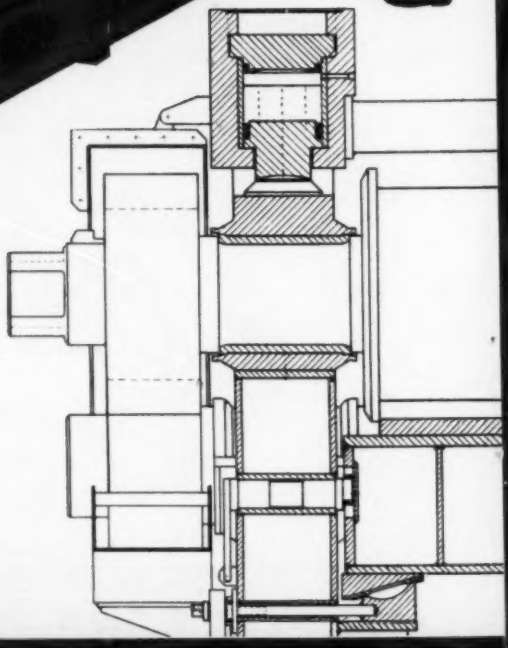
2915 North Market
St. Louis 6, Mo., U.S.A.

Leo Freeman, V. P. Sugar Mill Div.
2530 Terrace Ave., Baton Rouge, La., U.S.A.

Manufacturer of
Shock Grain Pulverizers
Cane Trash Shredders
Bagasse Cleaner
and Filter Aid
Bale Breakers
Elevating and
Conveying Equipment

SMG
SALZGITTER

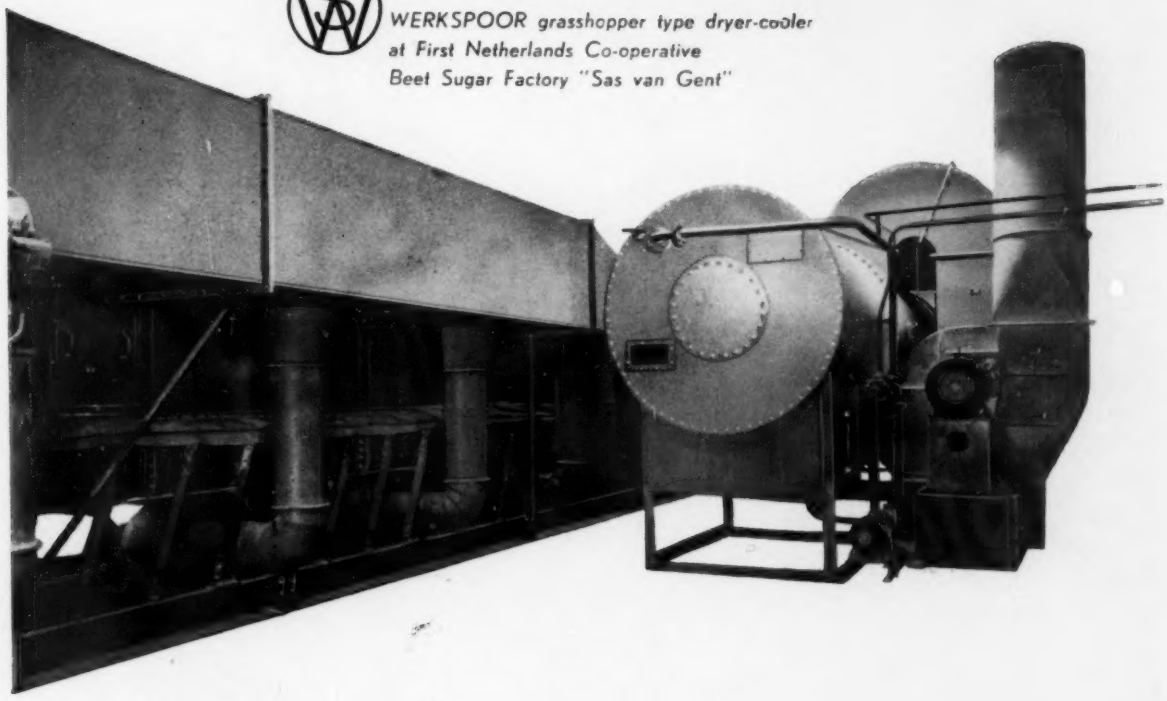
SALZGITTER
SUGAR CANE MILLS of most modern design
with plain or roller bearings



- **The two part mill headstocks can be quickly connected and disconnected by means of a keyed joint.**
- **Mill headstocks of all-welded construction offer maximum security against fracture**
- **Long working life through efficient anti-corrosion protection of surfaces in contact with juice.**
- **The smooth inside surfaces of the mill headstocks exclude the possibility of the formation of fermentation pockets**
- **Bagasse bridge with trash plate adjustments arranged outside headstocks**
- **Tilted or vertical hydraulic head**

Expert advice from specialist engineers can be obtained from our technical service department.

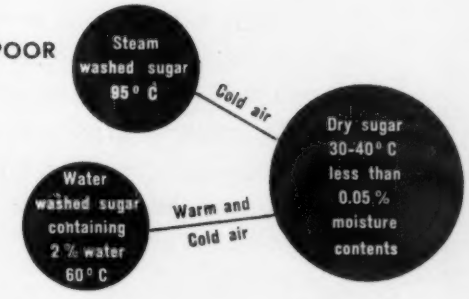
SALZGITTER MASCHINEN AKTIENGESELLSCHAFT
SALZGITTER-BAD (Western Germany)
3441
telex: samag sgtr 0953805
samag



WERKSPOOR grasshopper type dryer-cooler at First Netherlands Co-operative Beet Sugar Factory "Sas van Gent"

This new WERKSPOOR *grasshopper type dryer-cooler* keeps the lustre of your sugar

with its simple and low construction, economical working, built in any capacity you may require, this modern WERKSPOOR apparatus will guarantee you:

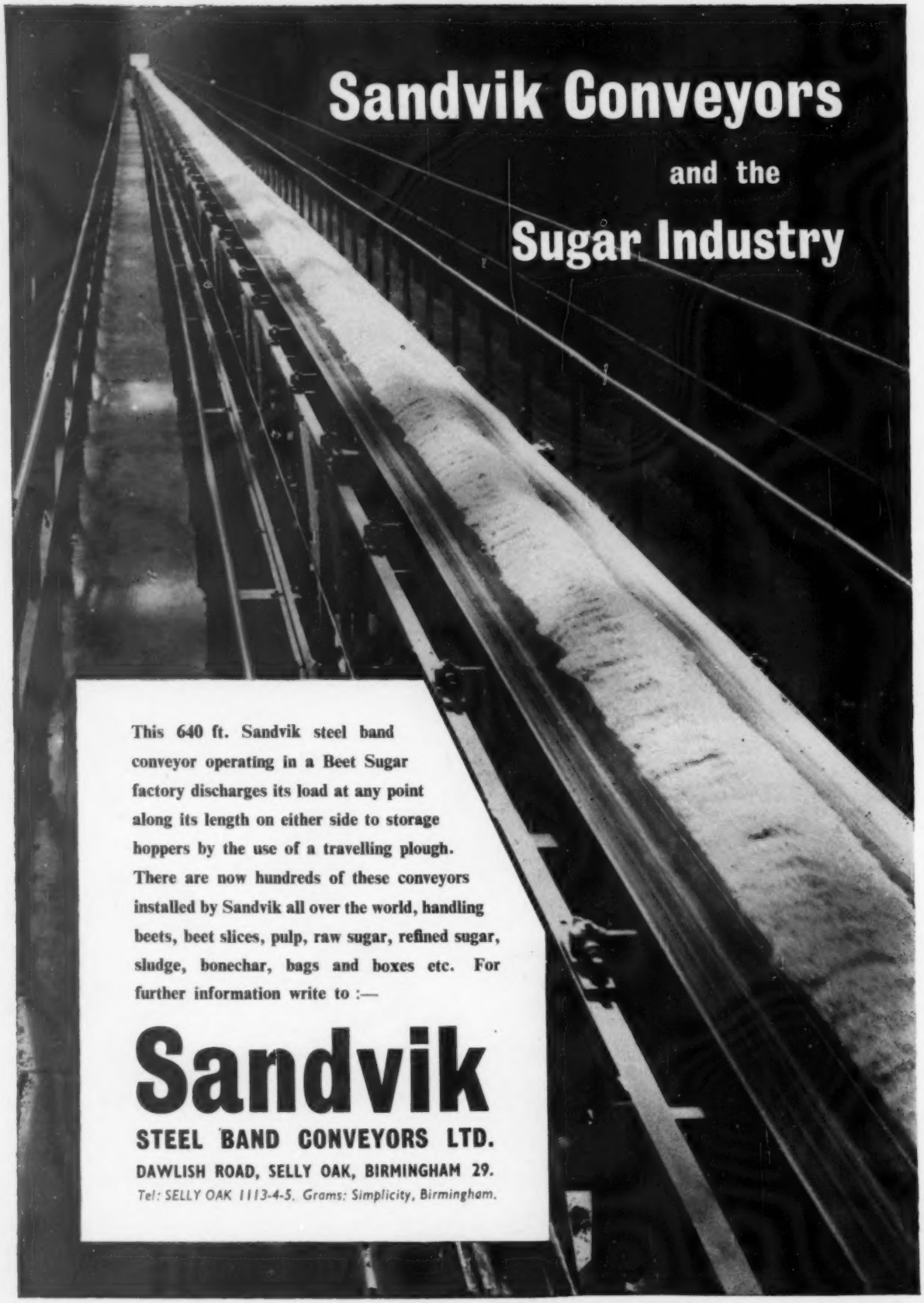

Steam washed sugar 95° C
Cold air
Dry sugar 30-40° C less than 0.05 % moisture contents
Water washed sugar containing 2 % water 60° C
Warm and Cold air

- **absolutely undamaged crystals**
- **drying and cooling in record time**
- **close contact air-sugar**
- **completely dust free atmosphere**

STORK — VERENIGDE MACHINEFABRIEKEN V·M·F NEDERLAND STORK • WERKSPOOR — WERKSPOOR

For grasshopper type dryer-coolers please apply to Werkspoor, Amsterdam

Bauduin



This 640 ft. Sandvik steel band conveyor operating in a Beet Sugar factory discharges its load at any point along its length on either side to storage hoppers by the use of a travelling plough. There are now hundreds of these conveyors installed by Sandvik all over the world, handling beets, beet slices, pulp, raw sugar, refined sugar, sludge, bonechar, bags and boxes etc. For further information write to :—

Sandvik

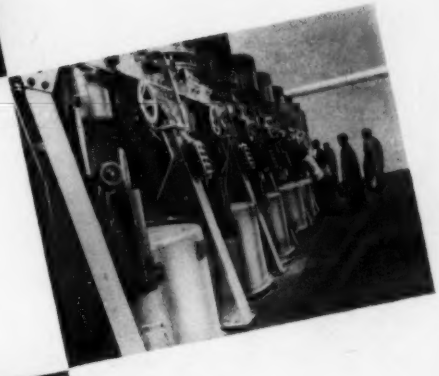
STEEL BAND CONVEYORS LTD.

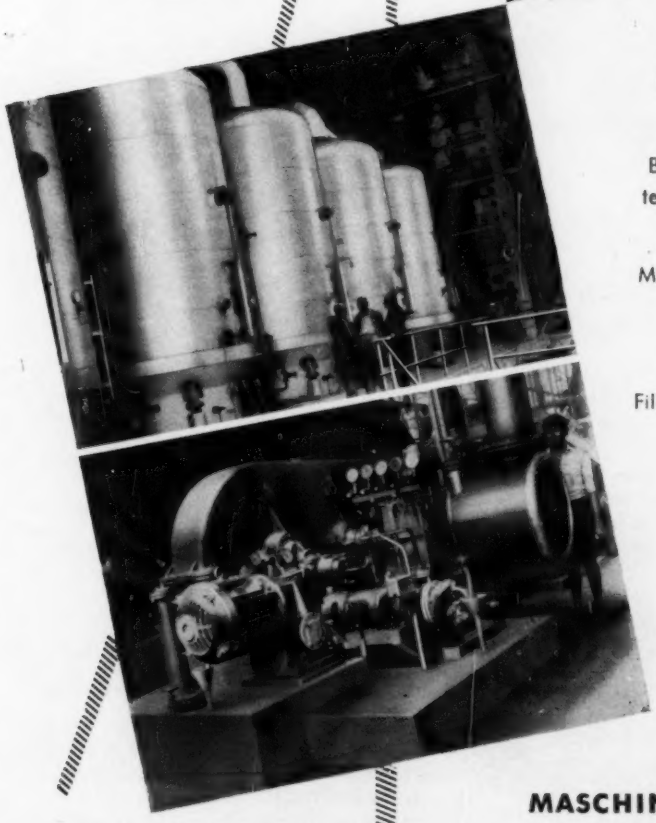
DAWLISH ROAD, SELLY OAK, BIRMINGHAM 29.

Tel: SELLY OAK 1113-4-5. Grams: Simplicity, Birmingham.

COMPLETE SUGAR FACTORIES

INCLUDING
CUBE SUGAR AND LOAF SUGAR PLANTS





for the production of cane sugar up to highest grade refined sugar.

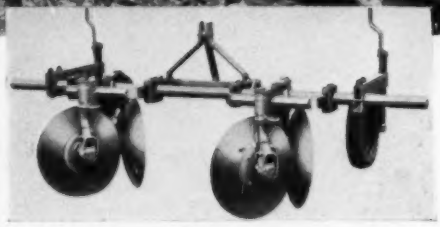
Basing on modern development in sugar technology we modernize plants of older design to obtain the highest economy.

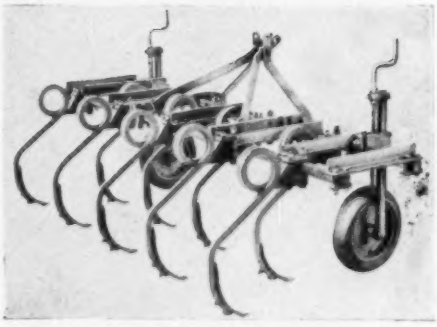
Mill plants with single and group drive · Especially reconstruction of outdated mills · Centrifugal machines for white sugar, refined sugar, raw sugar. Filter plants suitable to solve all problems of filtration · Drying plants for the sugar industry · Power stations for all pressures and capacities.

Delivery of single machines and apparatus · Planning and erection of complete cane and beet sugar factories.

MASCHINENFABRIK BUCKAU R. WOLF
AKTIENGESELLSCHAFT · GREVENBROICH-NEUSS
(WESTERN GERMANY)

9068 a





VERSATILE MOUNTED TOOLBARS

Versatility, simplicity and strength are among the main features of these modern mounted toolbars. The same frame can be used for a variety of operations, and conversion from one form to another—for cultivating, ridging, covering, lifting, hoeing, seed bed preparation etc., can be easily carried out.

C.68 This is a heavy duty frame, shown above with 4 small ridging bodies and tines for breaking up the soil in advance of the bodies. Larger bodies for deeper work and wider ridges or furrows are available.

On the right the C.68 is shown with pairs of discs for conditions where disc ridging is preferred. For seed-bed preparation two gangs of 8 or 10 discs mounted on an adjustable swivelling frame can be fitted. Rigid or coiled spring tines are available for cultivating.

C.73 This is a lighter frame for medium tractors, shown in the bottom picture with coiled spring tines. 9 rigid tines are an alternative fitting, and the width cultivated is 7′ 10″. Similar in construction is the C.74 which can have 9 or 11 tines for a total width of 9′ 8″.

Other fittings for both C.73 and C.74 include ridging, lifting and covering bodies, while for exceptional accuracy in row-crop work a steerage attachment can be fitted.

Write for illustrated literature of these and the numerous other implements in the wide Ransomes range.

DISTRIBUTORS THROUGHOUT THE WORLD

Ransomes

Famous throughout the world for agricultural machinery

RANSOMES SIMS & JEFFERIES LTD., IPSWICH, ENGLAND

YORKSHIRE IMPERIAL

place at your disposal
their long, specialised experience
in the metallurgical development
and manufacture of

TUBES FOR THE SUGAR INDUSTRY

The resources of Yorkshire Imperial Metals Limited are devoted solely to the manufacture of non-ferrous tubes, plates and fittings, and plastic tubes and fittings. They have long been intimately associated with the Sugar Industry, both at home and overseas, and have made a careful study of the varied and often arduous operating conditions which obtain in the Industry. This study has resulted in the development of improved tube and plate alloys, metallurgically designed and scientifically manufactured to give the best possible service. This unrivalled experience is at your service, free of charge and without obligation, to assist in the solution of problems of all kinds affecting the life and use of non-ferrous tubes and plates.

Yorkshire Imperial craftsmanship, metallurgical skill and specialised experience, together with modern plant and methods and accurate control at every stage of manufacture, account for the enviable reputation which *Yorkshire Imperial* tubes and plates and *Yorkshire Imperial* fittings have achieved in their respective fields.

TUBES IN "YORCORON" · "KUNIFER 10" · COPPER AND "SEVA" BRASS · PLATES IN A WIDE RANGE OF ALLOYS · BI-METAL TUBES AND PLATES.

YORKSHIRE IMPERIAL METALS LIMITED

HEAD OFFICE—P.O. BOX 166, LEEDS.

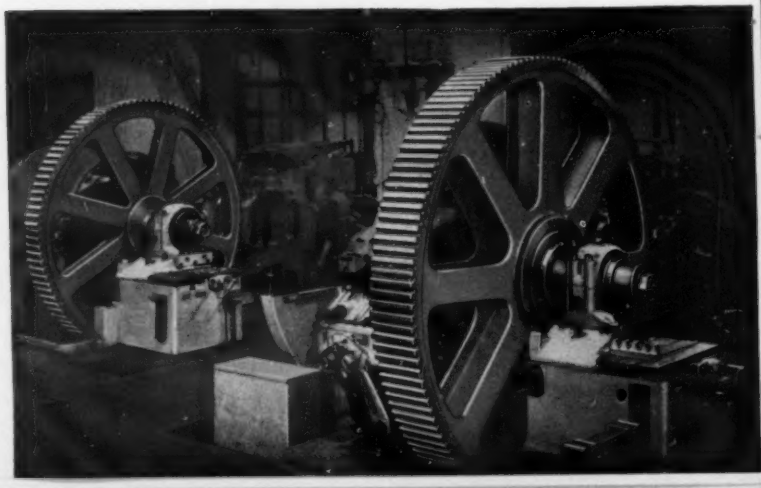
TELEPHONE: LEEDS 7-2222

Helping to sweeten it is our cup of tea

Tea needs sugar. Sugar needs refining. Refineries need gears. Big gears, heavy gears, reliable gears. That's where the Jackson Division of David Brown comes in.

What, in particular, can David Brown offer? First, the advantages in speed and reliability of having casting, machining and cutting carried out in the same organisation. Second, the capacity to produce heavy-duty gears—spur, helical or bevel—up to any size and weight for any industry and every bit as accurately as you need. Third, the finest advice on heavy gear design problems that you will find anywhere.

Behind every 'Jackson' gear there are over 100 years of sound technical experience. In front of every 'Jackson' gear there is a long, long life of hard, hard work. And the bigger your requirements, the better David Brown can handle them.



DAVID BROWN

THE DAVID BROWN CORPORATION (SALES) LIMITED

JACKSON DIVISION · SALFORD WORKS

HAMPSON STREET · MANCHESTER 5

Telephone Blackfriars 3577 (4 lines)

100 YEARS

OA/5860

Meet every cane carrying need with LINK-BELT

SS-600

CHAIN

Here's the chain that satisfies the demands of the most severe cane carrier service. In fact, with an average ultimate strength of 100,000 lbs., Link-Belt SS-600 chain is the strongest for its weight per foot of any cane carrier chain.

There's good reason for such remarkable capacity. Manufacture and assembly of this 6-inch pitch chain are closely controlled to provide the extra wear resistance necessary for long, trouble-free operation.

In addition to SS-600 chain, Link-Belt offers other 6-inch as well as 8-inch pitch carrier chains. Link-Belt can also furnish cane carrier slats in a broad range of types and sizes. For facts, call your Link-Belt representative or write for Book 2640 covering all Link-Belt sugar-handling equipment.

15,052R

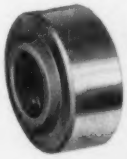
LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Engineers • Manufacturers • Exporters of Machinery for Handling Materials and Transmitting Power • Established 1875.

EXPORT DIVISION: Dept 660-ISJ, 233 Broadway, New York 7, U.S.A., Cable Address: Linkbelt—New York • Australia, Marrickville (Sydney) • Brazil, Sao Paulo • Canada, Scarboro (Toronto) • South Africa, Springs • Representatives Throughout the World

SIDEBARS are made of medium carbon alloy steel and are heat-treated to give optimum strength. Pin and bushing holes are accurately machined for correct pitch.

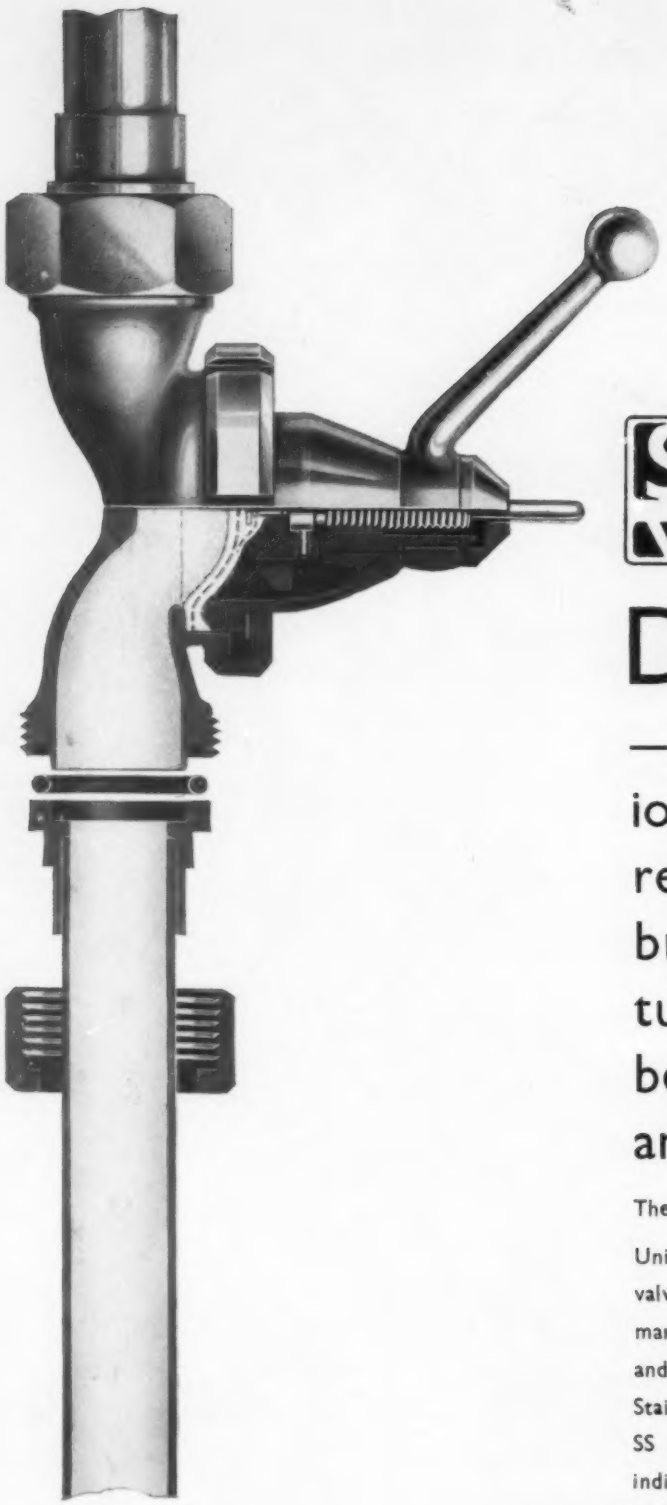


ROLLERS are accurately machined and case-hardened to give long life. Bored smooth and true, they are finish ground on the O.D. to assure free rolling and minimum wear.

BUSHINGS are case-hardened and accurately made to close tolerances. The O.D. is finish ground for controlled press fit in the sidebars and to provide smooth, even bearing surfaces for the rollers.

PINS of alloy steel are heat-treated and finish ground. They are positively locked against turning in the sidebars. Holes are drilled in pins and bushings for pressure lubrication.

COTTERS are furnished in brass as standard for greater corrosion resistance.



SAUNDERS DIAPHRAGM VALVES

DIFFERENT

— to satisfy such fastidious industrialists as refiners, dairymen, brewers and manufacturers of foodstuffs, beverages, medicines and all edible fluids

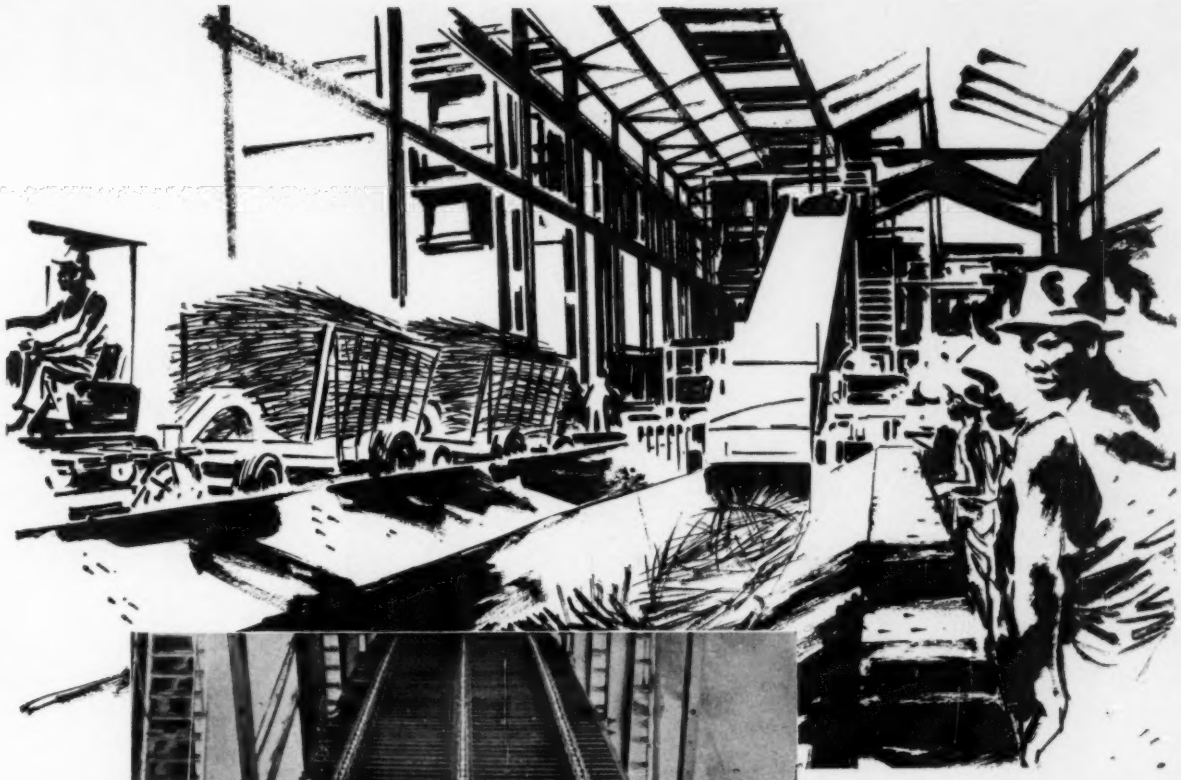
The Easy Access 'L' Valve is illustrated.

Union nuts permit speedy removal of the complete valve and a quick-release clamping nut simplifies dismantling of the body for frequent sterilizing (bonnet and mechanism being isolated need no such treatment). Stainless steel body, polished internally and externally. SS handle. Polished aluminium bonnet. Position indicator. Sweetened diaphragm. Sizes 1"—3".

SAUNDERS VALVE COMPANY LIMITED

DIAPHRAGM VALVE DIVISION

CWMBRAN · NEWPORT · MONMOUTHSHIRE



6,655,000 tons of cane

carried in 32 years without need for repair — typical of the inherent toughness of

RENOLD

steel chains for conveying and elevating

Write for leaflet Ref. 120/26 giving full details of Renold conveyor chains — designed and manufactured for heavy and arduous duties in the cane sugar industry.

RENOLD CHAINS LIMITED · MANCHESTER

SPENCER SUGAR HANDLING PLANT

Mobile high-speed throwers of the kind illustrated are ideal for piling many bulk materials. This machine can throw 220 tons per hour of raw sugar to a height of 50 feet over a distance of 90 feet. Similar throwers have been designed to handle up to 500 tons per hour.

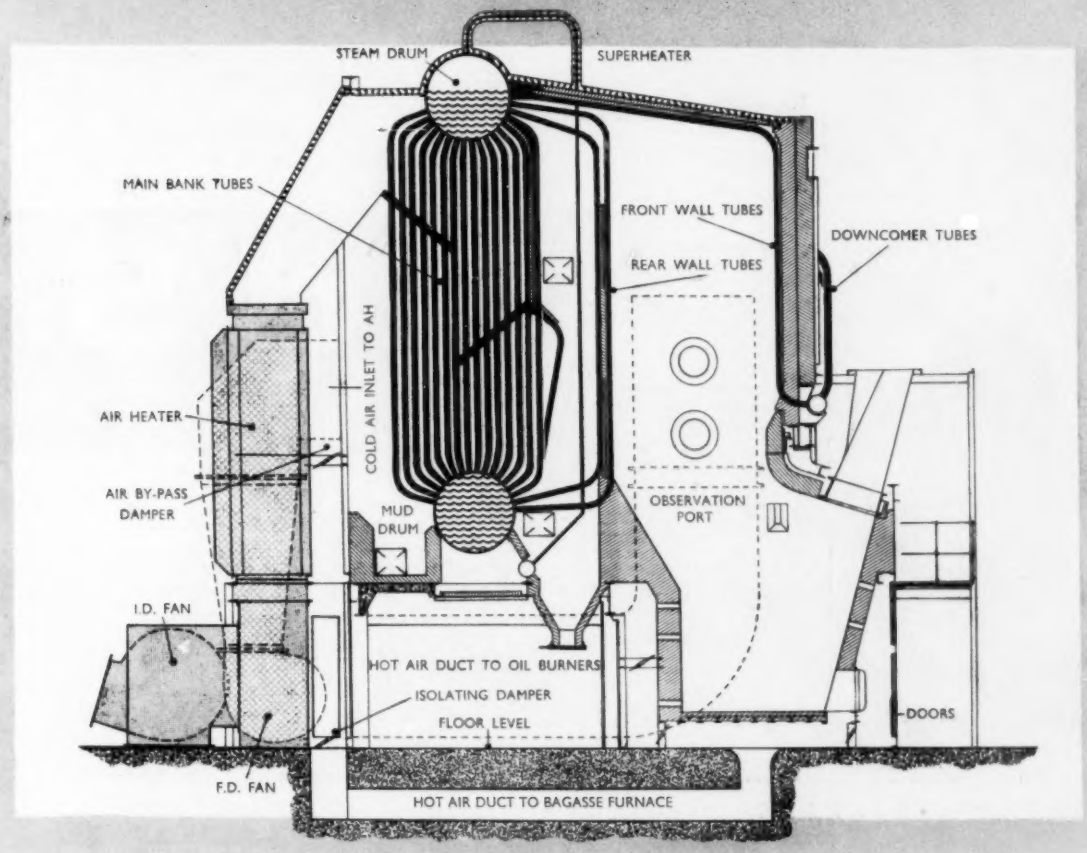
SPENCER (MELKSHAM) LIMITED
MELKSHAM · WILTSHIRE

BRANCH OFFICES :
Ingersoll House, 9 Kingsway, London, W.C.2.
Tel. : Covent Garden 1800
34 Castle Street, Liverpool 2. *Tel.* : Liverpool Central 3738
34 Great North Road, Newcastle-upon-Tyne
Tel. : Newcastle 26800

SPENCER

HANDLING PLANT

Water tube boilers with JOHN THOMPSON-EISNER BAGASSE FURNACES



There is no mechanical feed to give trouble in the Thompson-Eisner furnace. The rate of feed, by gravity, is controlled by the rate of burning which in turn is regulated by the air dampers. High outputs are obtainable, and the furnace quickly responds to varying demands. Ashing is required only once a week and the simple brickwork needs very infrequent attention. The John Thompson Integral Water Tube Boiler here shown fitted with Thompson-Eisner furnace is specially designed for the sugar industry. Water walls provide for rapid response to varying loads, reduce the area of exposed brickwork and prevent slag formation. Vertical water tubes ensure good circulation, and may be easily cleaned after removal of a man-lid. Available for evaporations up to 300,000 lb/hour with working pressures up to 1,000 lb/sq. inch and steam temperatures up to 850°F

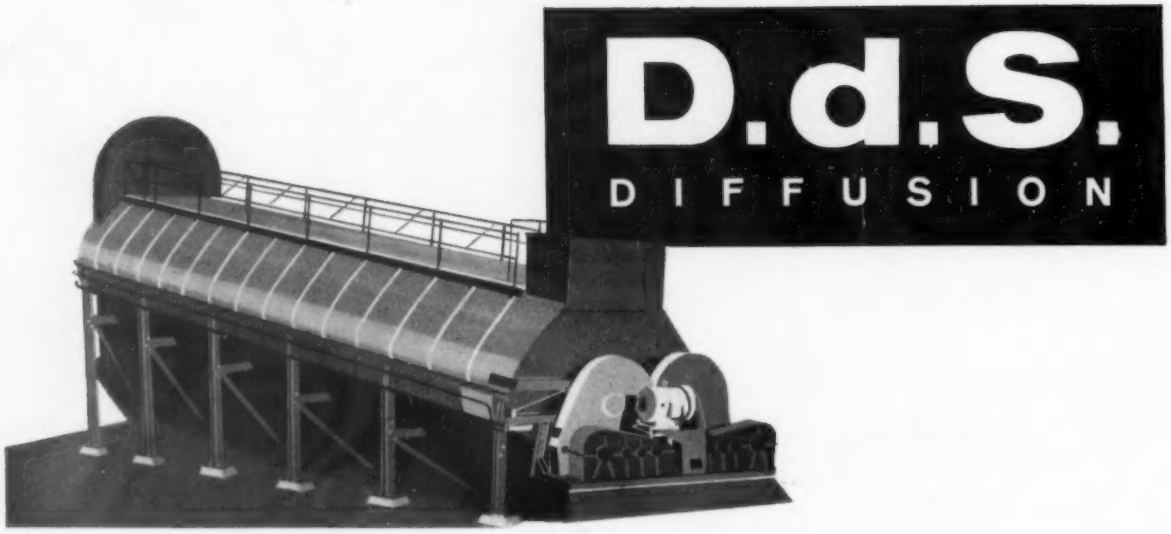
JOHN THOMPSON WATER TUBE BOILERS LIMITED · JOHN THOMPSON GROUP

JOHN THOMPSON WATER TUBE BOILERS LIMITED
WOLVERHAMPTON · ENGLAND

WTSU.1

The best result

is obtained by the



AKTIESELSKABET DE DANSKE SUKKERFABRIKKER
COPENHAGEN · DENMARK

The lowest investment

The cheapest maintenance

The lowest draft and pulp losses

The smallest fuel consumption

The best pulp-pressing

IN OPERATION ALL OVER THE WORLD

International Sugar Journal

VOL. 62 *June, 1960* No. 738

Editor and Manager :
D. LEIGHTON, B.Sc., A.R.I.C.

Agricultural Editor :
H. MARTIN-LEAKE, Sc.D

Assistant Editor :
M. G. COPE, A.I.L.(*Rus.*)

Panel of Referees

L. D. BAVER,
Director, Experiment Station, Hawaiian Sugar Planters' Association.

A. CARRUTHERS,
Director of Research, British Sugar Corporation Ltd.

F. M. CHAPMAN,
Technical Adviser, Tate & Lyle Ltd.

J. EISNER,
Technical Adviser, Booker Bros. McConnell & Co. Ltd.

P. HONIG,
Consulting Sugar Technologist.

J. CAMPBELL MACDONALD,
Chief Technical Officer, British Sugar Corporation Ltd.

H. C. S. DE WHALLEY,
Consultant, Tate & Lyle Ltd.

O. WIKLUND,
Swedish Sugar Corporation.

* * *

Published by:
The International Sugar Journal Ltd.
Central Chambers, The Broadway,
London, W.5.
Telephone : EALing 1535
Cable : Sugaphilos, London.

* * *

Annual Subscription : 32s 0d. or $5.00 post free
Single Copies : 2s 6d or 45 cents post free

PAGE

Notes and Comments 149
Tate & Lyle Investments Ltd., 1959 Report. Egyptian Sugar Industry expansion. American Sugar Refining Co. 1959 Report. European beet area estimates.

* * *

Agricultural Articles:

The Sugar Cane in Australia 151
59th Annual Report, Bureau of Experiment Stations, Queensland, 1958–59.

Agricultural Abstracts 152

Gibberellic Acid 153

Soil Drying and Soil Fertility 154

* * *

General Articles:

The Defective Structure of Sugar Crystals .. 155
By Minoru Kamoda, M.Sc., and Takeo Yamane, D.Sc.

Ndola Sugar Refinery, Southern Rhodesia .. 159

* * *

Sugar-House Practice 163
Evaluating plantation white sugar by colour values. Factory research in Hawaii. Studies on the storage life of jaggery—note on a quick and simple method of assessing the comparative keeping quality of various packaging materials *etc.*

Beet Factory Notes 165
New information on the coke-fired lime kiln. Recycling sugar factory waste waters. The microbiology of the Sewdish granulated sugar production. Purification of sugar factory waste waters *etc.*

New Books and Bulletins 169
Sugar Plant Guide Book. Lamborn's Compendium of World Sugar Statistical Data. Pest Infestation Research. The Gilmore Louisiana—Florida Sugar Manual 1959. Sugarcane and its Diseases.

Laboratory Methods and Chemical Reports 170
Rapid factory analysis for determination of invert sugar, lactic acid and amino acids in sugar factory products. The development of polarimetric sugar determination. Radiolysis of sucrose *etc.*

By-Products 172
Development of basic organic chemicals in India IV. Products from sucrose. Fodder yeast from waste molasses. Alkali metal derivatives of sucrose. IV. The problem of 'firmly bound' ammonia.

Patents 173
Crushing Mills. Pulping of cellulosic material. Ether esters of sucrose. Glutamic acid recovery.

Trade Notices 174
Automatic Polarimeter. "Par-O-Mount" gear units *etc.*

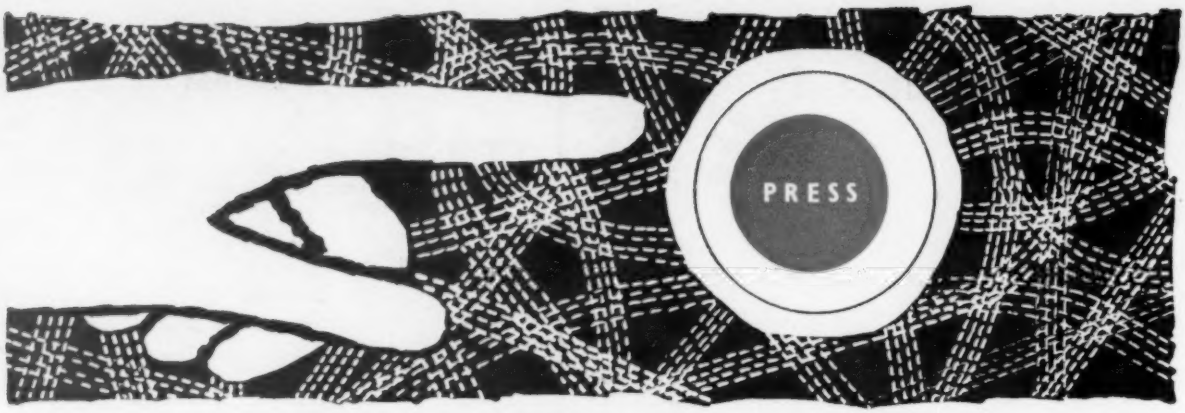
Canadian Sugar Imports 175

European Sugar Beet Area, 1960/61 175

Stock Exchange Quotations 176

Brevities 175–6

Index to Advertisers 1

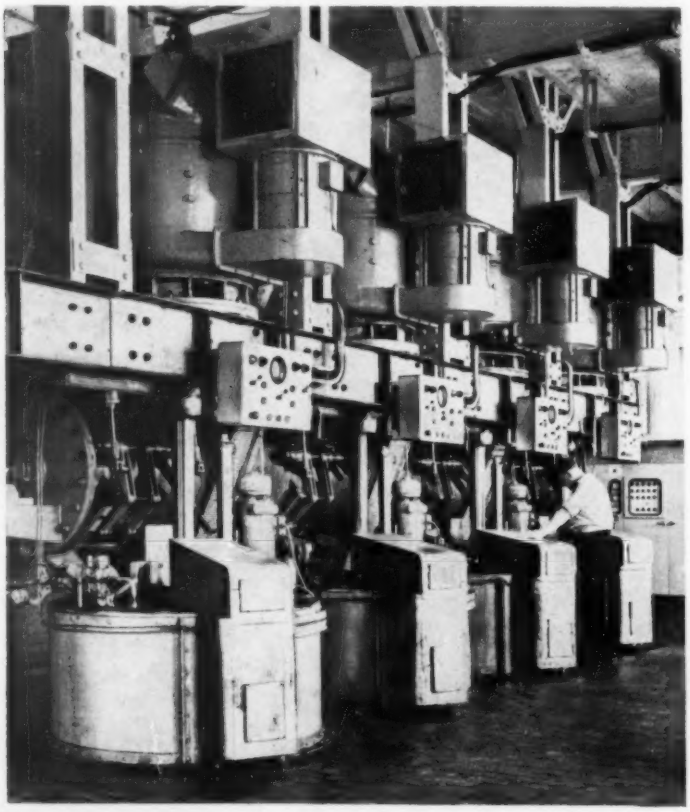


AUTOMATIC

SPINNING
WATERWASHING
BRAKING
DISCHARGING

Speed 1200 r.p.m., having automatic electronic cycle control, with alternative hand control of each automatic operation.

4—48" × 30" High Speed Electrically driven Centrifugal Machines driven by Ward Leonard System with Electronic Control



WATSON LAIDLAW
AND COMPANY LIMITED

DESIGNERS AND MANUFACTURERS OF MODERN CENTRIFUGAL MACHINES

98 LAIDLAW STREET • **GLASGOW, C.5**

Telephone: SOUTH 2545 *Telegrams:* "FUGAL" GLASGOW

THE
INTERNATIONAL SUGAR JOURNAL

VOL. LXII JUNE, 1960 No. 738

NOTES AND COMMENTS

Tate & Lyle Investments Ltd. 1959 Report.

Raw sugar production.—Each of the three West Indies companies had difficulties during 1959. Trinidad experienced a drought more severe than any recorded for over thirty years, resulting in a serious check to growth of cane, with a consequent reduced yield of sugar per acre. As a result, costs showed a sharp increase and the profits of Caroni and Ste. Madeleine suffered accordingly. Prospects for 1960 are fair but much will depend on the extent to which the 1960 crop may have been affected by the drought.

In Jamaica, the West Indian Sugar Co. Ltd. also had a most difficult year. A severe attack of West Indian cane fly, against which it was not possible to take action in time to protect the 1959 crop, very seriously affected yields and costs. Unpleasant labour troubles also arose in connexion with the collective wages agreement between the Unions and the Sugar Manufacturers' Association. Selective strikes were called at seven out of the twenty estates in the islands. A Government-appointed Commission of Enquiry reported earlier this year and recommended the payment of a crop bonus of 12½% on all earnings during the 1959 crop period and the payment of an increase of 12½% in all wage rates from the start of the 1960 crop.

As a result of the combined effects of attacks by insect pests, adverse climatic conditions and the recommendations of the Commission of Enquiry, the Company made a small trading loss as compared with a profit of £360,000 in 1958. The 1960 crop is proceeding more smoothly, but it is too early to forecast the results.

There are prospects of quite a good crop of sugar in 1960 at Chirundu Sugar Estates, Southern Rhodesia, where about 3000 acres are now under cane. The factory capacity has been improved in anticipation of a greater yield after modifications have been made in the overhead irrigation system to give a better coverage. The power line from Lusaka came into commission in May 1959 so that the power requirements of the estate are now fully met by Lusaka Electricity Supply Corporation.

Refined sugar production.—John Walker & Co. Ltd. have had another successful year. In the summer of 1959, certain new plant became fully operative, the benefits from which will be reflected in lower costs in future years.[1]

During the Group year the holding in Canada & Dominion Sugar Co. Ltd. was further increased, but dividends from this company did not show a corresponding increase owing to a reduction in the rate of dividend being paid. A controlling interest in the Canada & Dominion Sugar Co. Ltd. was recently acquired by Tate & Lyle.[2]

The Ndola sugar refinery[3] in Northern Rhodesia is expected to be completed soon and will greatly facilitate the supply of refined sugar in the territory, particularly in the copperbelt area. When the new refinery comes into production the Rhodesia Sugar Refinery Ltd. will have a productive capacity in excess of immediate requirements and every effort will be made to develop the latent demand which exists in the Federation.

Shipping.—Sugar Line Ltd. was again affected by extremely low freight rates which prevailed throughout the year. In recent months there has been some improvement, but in view of the very large tonnage of shipping laid up throughout the world, it is too early to be confident that the increase in freight rates will continue.

Technical services and sugar machinery manufacture.—Tate & Lyle Technical Services Ltd. assisted the Canada & Dominion Sugar Co. Ltd. in the commissioning of their new refinery at Toronto, which started as scheduled in May 1959 and quickly attained the designed throughput. This plant, the design and layout of which was the result of collaboration between the two companies, has been generally accepted as representing a considerable advance in economic sugar practice. Progress with the Ndola refinery in Northern Rhodesia has continued according to plan.

[1] See *I.S.J.*, 1960, **62**, 69.
[2] *I.S.J.*, 1960, **62**, 29.
[3] *I.S.J.*, 1960, **62**, 159.

A. & W. Smith & Co. Ltd. have had a record year both in turnover and profit. Major contracts for new plants have been completed in the West Indies and in India, and they are at present engaged in the design, supply and erection of a new sugar factory and refinery in Swaziland.

* * *

Egyptian sugar industry expansion.[1]

During the second industrial Five-Year Plan, Egyptian sugar production is to be considerably increased. The second Plan starts with the financial year 1960/61. Apart from an extension of the sugar cane acreage of Upper Egypt the annual production capacity of the sugar factory in course of construction at Edfu is to be doubled and thereby to reach 80,000 tons. This factory is being built by Japanese firms with Japanese credits and machinery. It is to be put into operation in 1961. Apart from the Edfu factory a further sugar factory with an annual capacity of 40,000 tons is to be erected. The present production capacities of the factories of Kom Ombo and Armant are to be increased from 100,000 tons to 120,000 tons a year. Also, the sugar refinery of Hawamdieh is to be modernized.

Simultaneously with the expansion of the sugar industry the production of sugar cane is also to be increased. Since 1954 the sugar cane area has been about 46,000 hectares, while the crops have increased steadily. The Sugar Cane Cultivation Department of the Egyptian Ministry of Agriculture is continuously testing new sugar cane varieties in order to increase the cane yields per hectare. Hitherto about 76% of the harvested sugar cane was processed into sugar, while the rest was consumed as sugar cane juice or was used to produce molasses. Apart from an increase in sugar cane production, the cultivation of sugar beets in Lower Egypt is provided for. For this purpose a beet sugar factory is to be erected in the Egyptian Liberation Province. The increase in Egyptian sugar production is not only to serve the covering of the domestic requirements but also for imports. At present Egypt is principally exporting sugar to the Sudan.

* * *

American Sugar Refining Co., 1959 Report.

Income from the Company's domestic operations in 1959 continued at a satisfactory level, but earnings from Cuban sources were sharply reduced. Deliveries of refined sugar for the year were approximately the same as for 1958. A modest increase in the total national distribution is anticipated during 1960.

Expenditures for additions and improvements to domestic plants and equipment are continuing at a high level, and several important projects, including the new refinery in Boston, will be completed during 1960. Substantial progress is also expected on the major reconstruction of packaging, warehousing and shipping facilities at the Brooklyn refinery. This work was started in early 1959 and is scheduled for completion late in 1961. Expenditure for additions and improvements to existing plant and equipment for and construction of the new refinery totalled $24,548,427 during 1959, compared with $13,329,972 in 1958. The total included $23,621,220 for domestic operations and $927,207 for Cuban operations.

The 1959 raw sugar production of the Company's Cuban subsidiaries was approximately 2% greater than that for 1958, but profits from 1959 operations were substantially lower. The price of raw sugar in the world market and the price obtained by the Cuban Sugar Stabilization Institute for blackstrap molasses were both substantially below prices prevailing in 1958 and other recent years. Labour unrest hampered orderly operations and added to costs. Earnings were also adversely affected by abnormal changes resulting from special assessments, the imposition of arbitrary increases in certain wages and an increased tax burden.

* * *

European beet area estimates.

The first estimates of the European beet areas for the 1960/61 campaign were recently issued by F. O. LICHT K.G.[2] and are reproduced elsewhere in this issue. Discussing these estimates, C. Czarnikow Ltd.[3] draw attention to the fact that the Russian estimate shows an increase of no less than 250,000 hectares, it now accounting for more than half of the total beet area of Europe.

"Of the Western European countries the French estimate is put at 375,000 hectares, an increase of 21,000 hectares, whilst the Turkish area is put at 197,718 hectares against 166,993 hectares in 1959. On the other hand, the Italian figure is down by 72,000 hectares to 230,000 hectares. Estimates of sowings in most Eastern European countries show some change in relation to last season but, outside Russia, only the Polish figure, put at 400,000 hectares against 369,000 hectares, is of much importance.

"The increase of 250,000 hectares in respect of Russia is considered by Licht to be very conservative in view of the steps which the authorities in that country are known to be taking to bring consumption into line with that of Western countries. The Polish figure is said to be a target so there may be some doubt as to whether this will eventually be achieved. The Eastern German estimate is a little down on the previous year's figure as a consequence of the recent policy of accelerated collectivization of farms in that country.

"Substantial stocks of sugar have accumulated in Italy in recent years due to the very good outturns which have been achieved coupled with the difficulty which has been encountered in disposing of surpluses. The Government has therefore limited the crop this season to the figure stated. The Spanish estimate is down somewhat by reason of the very heavy rains during the winter which hampered spring fieldwork."

[1] F. O. LICHT, *International Sugar Report*, 1960, **92**, (Supp. 8), 104.
[2] *International Sugar Report*, 1960, **92**, Supp. 8), 95.
[3] *Sugar Review*, 1960, (454), 79.

THE SUGAR CANE IN AUSTRALIA

59th Annual Report, Bureau of Experiment Stations, Queensland, 1958-59.

THE year under report was again one of over-production, indicating the need for restriction in the crop available for milling; under such circumstances stand-over cane is valueless. There are two reactions in such a situation: the desirable one of reduced acreage with maintenance of yield, or the undesirable one of maintenance of acreage with economies from reduced fertilizer, cultivation and irrigation, all leading to reduced yield. Harvesting every second year, another alternative, is not recommended, leading as it does to higher harvesting costs through lodging and increased damage from pests and diseases. In spite of a tendency towards the latter method, the interest and demand for improved services of all kinds, including better varieties, has not diminished.

Soils and Agronomy

Of fertilizer trials, 8 designed to test potash requirements were carried out with acre dressings rising by 60 lb KCl from nil to 300 lb. Significant responses were obtained in only two trials. Third leaf analyses yielded divergent results; in one case a significant response from a K_2O level of 1·7% but no response from a 0·92% level. Further, the level in all cases increased with age in both plant and ratoon cane. Except for one at Mackay, in which a cowpea-velvet bean mixture ploughed in prior to planting provided all the N required on the particular soil, the remaining trials are primarily of local interest.

As a result of poor ratooning or germination, unexplainable through normal factors of low fertility or disease, a study was made of the nematode position. Over 11 species were identified and a number of preliminary trials, including fumigation with EDB, DD and "Nemagon," were carried out. They do not tell the whole story but some remarkable reductions in nematode population and in increased yield have been obtained, particularly with "Nemagon."

A detailed study, conducted at 4 stations, of the losses incurred in cut-up cane as delivered by the Massey-Ferguson harvester yielded the following summarized figures as % of original weight cut:—

	After 2 days			*After 4 days*		
	Cut up	*Whole*	*Excess whole*	*Cut up*	*Whole*	*Excess whole*
Weight cane ..	96·5	97·5	1·0	94·5	95·3	0·8
c.c.s.	98·0	99·2	1·2	95·9	98·3	2·4

These losses were equivalent to 1 ton c.c.s. for each 700–800 tons cane or a little less than 1/– per ton cane; a sum considerably less than the anticipated savings.

Station Reports

At the Northern Experiment Station the Breeding Cane Collection now numbers 409 varieties; many varieties not used in breeding have been transferred to the Elliott variety garden at Bundaberg. Fifty-nine new varieties were added for cross-pollination work together with 217 New Guinea varieties released from quarantine. Of the 44,000 seedlings raised, 8,000 were planted spaced and 36,000 in bunches. In the varietal ratoon trial, 54 N 7103 alone surpassed the standard, Pindar; in the plant cane trial, none.

In the hot-water treatment trials it was found that resistance to damage increased with the advancing season. At this Station the above noted study of losses in cut-up cane was made.

The major activities of the Lower Burdekin Experiment Station were concerned with the control of pests, diseases and weeds in the area.

In the trials of seedling selections an evident superiority was found from bunch planting. In the 1955 A series variety trials, 55 A 408 (10 tons sugar per acre) alone proved superior to the standard Pindar (9·5 tons) and Trojan (9·27 tons). It may be noted that prior to attaining Q status, seedlings are numbered by year, 55 in the above, letter (N = Northern, A = Lower Burdekin, C = Central and S = Southern) followed by seedling selection number.

At the Central Experiment Station varietal trials on the lines adopted at the Burdekin Station were employed. The 4th crop (2nd plant cane) was reaped in the comparative trial: bagasse plus deep ripping, bagasse only and control. The total respective yields for the 4 crops were 97·8, 91·7 and 85·5 tons, the benefits from the dual treatment being still marked in the 4th crop. Crops have been reaped in the long term trash trial without any significant advantage from trash conservation. In the long term phosphate trial no significant difference is apparent in the 5 harvests taken. Comparison between (a) a 6 month legume fallow (b) 4 year grass (c) 12 month plant crop followed by a year's grass and 6 month legume fallow (d) 12 month plant followed by 2½ year perennial legume gave the following average tons cane/acre (a) 23·1 (8 crops), (b) 31·22 (5 crops), (c) 27·03 (6 crops) and (d) 28·14 (6 crops). A repetition of the relative storage losses from cut-up and whole cane, mentioned earlier, showed no significant difference at this Station.

The report of the Southern Experiment Station records the general position with regard to diseases and pests together with a brief summary of seedling trials. The 5th harvest of a BHC toxicity trial with continuous dressing has shown no effect on yield.

Plant Breeding

Much attention has been paid to streamlining the technique of crossing and seedling raising and testing with the object of labour saving and/or handling larger numbers. For cross pollination lanterns the cloth was treated with an alum-lead acetate preservative which was found to have no deleterious effect on seed development. For germination, the filter cake compost mentioned in the last Report[1] again

[1] *I.S.J.*, 1959, **61**, 32.

gave excellent results. On occasion marcotting was used, for which German peat moss was used and in which rooting was more rapid than in sphagnum moss or soil.

The percentages of Queensland bred cane in the harvest remains relatively constant in the lower 80's, the slight variations being accounted for by varietal differences in stand-over cane and losses from drought, but a steady replacement of the two major exotic varieties CP 29–116 and N: Co 310 by Q 50, Q 58 and Q 61 is taking place.

Entomology and Pathology

During the period under report no serious outbreak of any pest or disease occurred but the report on the various pests and the latest method of control shows the need for an ever-watchful eye. An interesting problem, the product of over-production, is the under-selling by farmers of the hot-water treated cane supplied by the Pest and Disease Control Boards. Two divergencies from type are noted; at Mossman, specimens of the beetle *Lepidiota consobrina* with a one year, in place of the two year cycle, has been found through without other distinguishing characteristics; in the Mackay area, there is evidence of a new strain of mosaic which, however, requires confirmation.

H. M.-L.

AGRICULTURAL ABSTRACTS

Suggestions for terrace designs. ANON. *S. African Sugar J.*, 1959, **43**, 787–791.—The article reports a recent talk by W. H. OWEN of the Caterpillar Tractor Co. before Kansas conservationists. It describes the system of parallel terracing with its advantages over normal contour terracing. These advantages are, in the making of terraces, the greater use of bulldozers and, in cultivation, the adaptability for the use of implements through their uniformity in breadth.

* * *

Effect of spacing and seed rate under different levels of nitrogen. AJAIB S. BAINS. *Indian Sugar*, 1959, **9**, 329-332, 339-346.—A detailed account is given of a complex experiment conducted at Jullundur with 3 levels of N (0, 100 and 200 lb/ac), inter-row spacings (1, 2 and 3 ft) and two-budded setts per acre (25, 30 and 35 thousand). The best results obtained for plant cane were 2 ft spacing, 30,000 setts and 100 lb N per acre; for ratoons, 35,000 setts at the same spacing and N dressing.

* * *

Sugar cane cultivation in the subtropical districts of Spain. A MARASSI. *Riv. Agric. subtrop.*, 1959, **53**, 17–36.—In southern Spain the sugar belt stretches along the coast of Granada, Malaga and Almira for about 164 miles, and up to 40 miles inland in places. This region is frost free, with a dry subtropical climate which varies somewhat from one area to another. Sugar cane is usually grown in rotation with other crops and occupies the land from 4–6 years. Two years may then be devoted to such crops as maize, tomatoes, clover, beans, cotton and sweet potatoes. The average yield of cane is 800 q.li. per hectare, with a return of 8·75% extracted sugar or 60–70 q.li. per hectare. Varieties commonly grown are POJ 2727, POJ 2725, Tucumán B–76 and Co 290.

* * *

Breeding behaviour of certain agronomic characters of sugar cane at the U.S. sugar cane field station, Houma, La. L. P. HEBERT and M. T. HENDERSON. *Tech. Bull. U.S. Dept. Agric.*, 1959, (1194), 54 pp.—A comparison is made between certain characters of the single seedling stool and of its clonal progeny. In diameter of stalk the comparison was closest, with a high correlation in 40–60% of the stools of the 11 varieties involved. Significant differences were found between Brix as determined by field refractometer but a wide range of differences was found as between different crosses. A breeding programme is outlined on the basis of stem diameter, erectness, number of stalks and Brix.

* * *

Transmission of chlorotic streak disease. O. W. STURGESS. *Cane Growers' Quarterly Bull.*, 1959, **23**, 42–44.—With one exception, all experiments on transmission by insect vectors have proved abortive. Spread of the disease in newly infected areas suggested that it was associated with surface water drainage. This conclusion has now been confirmed by experimental data.

* * *

Control of grasses on Tully tramline. E. H. FOX. *Cane Growers' Quarterly Bull.*, 1959, **23**, 46–48.—"Dowpon", a trade name for di-chloropropionic acid, (also known as "Dalapon") was successful in supressing, with one application, *Panicum* and guinea grass under heavy rainfall conditions.

* * *

Cane transportation in Puerto Rico. R. J. LEFFINGWELL. *Cane Transport News*, 1959, **2**, (5), 2.—A brief survey is given of the revolution taking place in cane transportation with only 8 of the 29 centrals operating by rail and handling some 25% of the crop. Developments are in the direction of chain net side unloading and the avoidance of stock-piling by the alternative use of storage on semi-trailers.

* * *

The role of hybrid canes in the evolution of the sugar industry of Réunion. *Rev. Agric. Ile Réunion*, 1959, **59**, 201–211.—The succession of varieties which has taken place from the first planting of cane are reviewed with particular reference to their linkage with successive invasions by both diseases and pests.

Simazine

A new departure in weed control

One single pre-emergent application keeps young cane weed-free for months

persistent selective safe

Simazine products for weed control in sugar cane are available

In the USA and Puerto Rico through the distributors of Geigy Agricultural Chemicals, Ardsley, N.Y., as	Geigy Simazine 80 W
in Central and South America, Cuba, Haiti, the Dominican Republic, South Africa, the Philippines and Taiwan through the local distributors of J. R. Geigy S.A., Basle (Switzerland), as	Gesatop
in the British Commonwealth (other than Australia) through Fisons Chemicals (Export) Ltd., 95 Wigmore Street, London, W1, as	Simazine 50 W

I.S.J.

SUGAR BOOK DEPARTMENT

All books reviewed in this *Journal* may be obtained through our Sugar Book Department. Where no inclusive price is quoted in our review, 2s. 6d. should be added to cover the cost of packing and postage.

★ *Check your personal library against the list of basic books given below :*

		POST PAID
BASIC CALCULATIONS FOR THE CANE SUGAR FACTORY: *Eisner*	(1958)	**7s. 6d.**
PRINCIPLES OF CANE SUGAR MANUFACTURE : *Davies*	(1938)	**22s. 6d.**
CANE SUGAR AND ITS MANUFACTURE : *Geerligs* ...	(1924)	**32s. 6d.**
CANE SUGAR HANDBOOK (8th ed.) : *Spencer and Meade*	(1945)	**134s. 6d.**
SUGAR ANALYSIS (3rd ed.) : *Browne and Zerban*	(1941)	**183s. 6d.**
BEET SUGAR ECONOMICS : *Cottrell*	(1952)	**42s. 6d.**
POCKET SUGAR YEAR BOOK : *Int. Sugar Council*	(1957)	**11s. 0d.**
SUCRERIE DE BETTERAVES : *Dubourg*	(1952)	**62s. 6d.**
PRINCIPLES OF SUGAR TECHNOLOGY (Vol. I) : *Honig*	(1953)	**97s. 6d.**
(Vol. II): *Honig*	(1959)	**97s. 6d.**
TECHNOLOGY FOR SUGAR REFINERY WORKERS (3rd ed.): *Lyle*		**72s. 6d.**
LICHT'S INTERNATIONAL SUGAR ECONOMIC YEAR-BOOK & DIRECTORY	(1958-59)	**55s. 6d.**
SYSTEM OF CANE SUGAR FACTORY CONTROL (2nd ed.): *International Society of Sugar Cane Technologists*	(1956)	**13s. 9d.**
HANDBOOK OF CANE SUGAR ENGINEERING. *Hugot*, translated by *Jenkins*	(1960)	**172s. 6d**

The above prices include postage and packing.

Terms are strictly cash in advance.

Our Bankers are : Barclays Bank Ltd., 3 Great Tower Street, London, E.C.3.

SUGAR BOOK DEPARTMENT, International Sugar Journal, Ltd.

Central Chambers, The Broadway, London, W.5.

GIBBERELLIC ACID

VARIOUS attempts are being made to ascertain whether the stimulating effect of gibberellic acid on plant growth can be put to advantageous use in increasing the yield of cane and/or sugar per acre. Thus, the current 1959 report of the Experiment Station of the Hawaiian Sugar Planters' Association briefly refers to trials in which application of this acid was found to increase neither yield nor pol of cane. The account, given by P. W. BRIAN in a lecture before the Royal Horticultural Society[1], of the discovery of gibberellic acid, its influence on plant growth and development and the scientific significance of these influences will not, therefore, be without interest.

Early in the century a root disease of rice was identified in Japan and was given the name *Gibberella fujikuroi*. It had the unusual effect of stimulating seedling growth so that infected plants stood out prominently with an increased height of several inches. In 1926 E. KUROSAWA observed that nutrient solutions in which the fungus had been grown had a similar effect, whether applied to leaves or roots. Subsequent work in several countries identified four closely related substances, gibberellin A_1, A_2, A_3 (= gibberellic acid) and A_4, which were formed by the fungus.

With gibberellic acid now produced industrially, a wide range of observations have been made in recent years. Not only has it been found that many, and very varied, families of plants respond to the acid but that these responses vary equally widely both as to the part of the plant affected and the stage of maturity of the tissues involved. In the first instance, these responses were identified as isolated and unconnected phenomena, but recent work strongly suggests that these gibberellins are not the peculiar product of *G. fujikuroi*, but are substances partaking of the nature of hormones, having a wide distribution in plant tissues; it would, perhaps, not be going too far to say that many plants possess the capacity to produce them but that capacity remains dormant until called forth by environmental influences. This view is strengthened by the recent success of K. MACMILLAN and P. J. SUTER in obtaining gibberellin A_1 from runner beans.

Only sufficient evidence can be given here to indicate the field of knowledge and, perhaps, utility opened up by this most recent work. One of the characters studied by MENDEL in peas was length of stem, with long stem dominant. It is the dwarf pea only that shows response to gibberellic acid, from which it can be deduced that the tall pea possesses, as a genetic character, the capacity to produce the necessary hormone; and the same appears to be true of the runner bean as it has also been shown to be true of maize. In the case of biennials, in particular, the habits of forming a rosette the first year and a flowering stem in the second are linked with the two environmental influences, exposure to low temperatures or vernalization, and increasing day length or photo-period. Application of gibberellic acid will lead to stem formation thus eliminating both the vernalization and photo-period effects. Dormancy in tree buds may also be broken.

These few examples must suffice. The information now available gives at least a rough guide as to the nature of the effects of practical value likely to follow from that knowledge and, in particular, as to the time of application. More important, it may be at the present stage, will be the knowledge of what to avoid. Clearly the response to application to beet during the first season would be an enhanced number of "bolters". In the case of sugar cane application nearing the maturation period when growth is checked and sugar accumulates would probably be harmful, for it would lead to a vegetative growth in excess of the plant's capacity for assimilation and, in consequence, at the expense of the stored sugar.

H. M.-L.

A half million acres to spray. N. S. HANSON. *Sugar J.* (La.), 1959, **22**, (6), 9–11.—Weed control in Hawaiian cane fields commenced in 1913 using sodium arsenite and sodium chlorate, separate or in mixture, or diesel oil. Now some 110,000 acres, half the total area under cane—cane being a 2 year crop—including plant and ratoon, is sprayed 4–5 times until the crop covers in. The chemicals used and the problems of finding new chemicals to control resistant species and of the appearance of resistant strains are discussed. A control for *Passiflora pulchella*, now spreading rapidly, has yet to be found.

* * *

Four new "Q" canes. ANON. *Australian Sugar J.*, 1959, **51**, 665.—Descriptions are given of four new canes raised to "Q" rank. They are Q 69 (Co 281 × CP 29–116) suitable for drought-susceptible soils and slightly better than its ♂ parent as a stand-over cane; Q 71 (Co 270 × POJ 2878) with very high and well maintained sugar content but lodging on rich land and with low vigour on poor land; Q 72 (Co 281 × POJ 2878) a mid-season variety with marked tolerance of drought and probably useful as a stand-over crop; Q 73 (Trojan × Eros) a quick germinator, early maturing except on richer soils and with good sugar content in both mid and late season, a good ratooner, with standing flooding and wind.

* * *

Critique on apomixis in sugarcane. S. PRICE. *Econ. Bot.* 1959, **13**, 67–74; through *Plant Breeding Abstracts*, 1959, **29**, 4178.—Certain forms of apomixis may occur in *Saccharum*, but they probably do so very infrequently, for no progeny or individual seedling has been adequately demonstrated to be derived from any of the apomictic processes. The production of seedlings under conditions which exclude all possibilities of contamination and self or cross pollination is needed to provide evidence of apomixis.

[1] *J. Roy. Hort. Soc.*, 1960, **85**, 167–174.

SOIL DRYING AND SOIL FERTILITY

IN monsoonal tracts soil drying is a natural process and it is, perhaps, strange that so little study has been made hitherto of the physical responses to such conditions and their influence on fertility. The practice of burning. which might be termed soil drying by shock tactics, and the beneficial results derived therefrom have been known from early times and the practice was, and probably still is, adopted for the rice nurseries in India where transplanting rice is customary as well as in African practice, as noted by H. F. BIRCH in a recent paper[1].

Until recently, work on the subject had been intermittent and appeared to indicate two different but, perhaps, inter-dependent effects of drying: the first an improvement in the physical condition of the soil through flocculation of the colloids, the second a transformation of the nutrient substances in the soil from a potential to an active form. Later work during the fifties, which is also briefly reviewed, is concentrated on the chemical aspect and, from it, it appears that while increases in the availablility of all the major nutrient elements occur, they are particularly marked in the case of nitrogen. These independent observations on the effect of drying, however, hardly built up a connected story from which practical conclusions could be drawn, and an attempt, here summarized, was commenced to unravel the underlying principles by the East African Agriculture and Forestry Research Organization.

The broad results, for the actual data are not recorded in the paper, of this latest work may be briefly given. The first observation is that, on moistening, a dry soil undergoes decomposition of the contained organic matter with a flush of nitrogen mineralization, both ammonia and nitrate, which declines in a few days to be followed by a further flush on re-wetting. Of particular note is the fact that the magnitude of the flush is directly related to the humus content of the soil. The conclusion drawn from these observations is that the agency is microbiological activity. But there are recorded certain other observations which hardly appear to fit in with this explanation of microbiological activity. Thus, while simple air drying or drying over phosphoric anhydride produce very similar effects, these were greatly enhanced by oven heating. There appears also to be a time factor involved which can be expressed thus: the extent of N mineralization is a direct function of the logarithm of the time, or to double the amount of mineral N on moistening, the soil must be kept dry ten times as long.

The process is conceived as linked with the reaction of organic colloids and as falling into two stages: as the result of drying the amount of organic material passing into solution on wetting increases and, simultaneously, so does nitrification at the humus surface. As an indication of the extent of nitrification the following figures are given of the mineral N, in terms of sulphate of ammonia (lb per acre), formed on moistening soil containing 7% carbon after air drying for 3, 9, 12 and 17 weeks respectively: 1320, 2350, 2630 and 2809.

The paper is of interest as gathering together the observations of the earlier investigations and as adding thereto certain further conclusions. But it must be confessed that much remains obscure. Thus, if oven drying involves sterilization, an immediate and intense biological nitrification would hardly be expected; yet it is stated that heating greatly enhanced the effects. Again, G. AP GRIFFITH is quoted as saying that on a bare soil nitrate production started immediately with the onset of the rainy season and HAGENZIEKER as mentioning in vague terms a top soil flush of mineral N at the onset of the rainy season. Yet G. CLARKE, whose work antedates all the literature quoted, states of the Gangetic plains that "in North India the accumulation of nitrate reaches a peak point twice during the year—*before* the break of the monsoon . . . [2] This follows some 4–5 months' drought and is a time when microbial activity in the surface soil is at a minimum. It is curious, too, that no reference is made to the work of N. R. DHAR and his co-workers who, in numerous publications over the last some 30 years, have demonstrated the fixation of N under sterile conditions through the energy released during decomposition of organic matter. There are many loose ends to be brought together before it can be said that the related problems of soil drying and soil fertility are solved.

H. M.-L.

Mutation in *Colletotrichum falcatum* Went, the casual organism or red rot of sugarcane. 1. Induced by beta radiation. R. S. VASUDEVA, M. R. S. IYENGAR, B. S. BAJAJ & M. S. CHATRATH. *Indian Phytopath.* 1958, **11**, 91–95; through *Plant Breeding Abstracts*, 1959, **29**, 4185.—A stable mutant of *C. falcatum* (*Physalospora tucumanensis*) was induced as the result of growing the pathogen in a liquid medium containing ^{32}P with an initial activity of about 240 μc/ml. The mutant resembled the non-virulent type with dark-coloured mycelium and reduced sporulation. Its spores did not have the falcate shape characteristic of this fungus and were smaller and more variable in shape than the normal type.

* * *

Cane containerization ready in 1960. ANON. *Cane Transport News*, 1959, **2**, (6), 2.—Under this scarcely euphonious title are described the latest developments in cane transport in Hawaii. The objective of these is to reduce the costs of harvesting and hauling, which form the largest field costs, and also the sugar losses. The essence of the system is the semi-trailer divorced from expensive prime movers and used for roller storage in the mill yard. A new design of track-laying tractor with rapid disconnection of the trailer by the driver allows the semi-trailer to operate in-field under all conditions. Mill yard storage in these trailers allows direct delivery to the feeder table, eliminating mill yard cranes and deterioration losses through stock-piling. The various stages are illustrated.

---

[1] *Trop. Agric.* 1960, **37**, 3–10.
[2] *I.S.J.*, 1948, **50**, 202.

THE DEFECTIVE STRUCTURE OF SUGAR CRYSTALS

By MINORU KAMODA, M.Sc.[1] and TAKEO YAMANE, D.Sc.
Japan Sugar Refiners' Association

MOST sugar crystals are presumed to have a more or less mosaic structure, i.e., they are built up of small packets which are arranged irregularly although each packet is composed of a number of well ordered molecules[2]. Such an imperfect structure of sucrose crystals seems due either to the large velocity of their growth, temperature change during their growth or to impurities enclosed within the crystal lattice. Variation in their melting point, specific gravity and hardness probably results form such an irregularity of crystal structure.

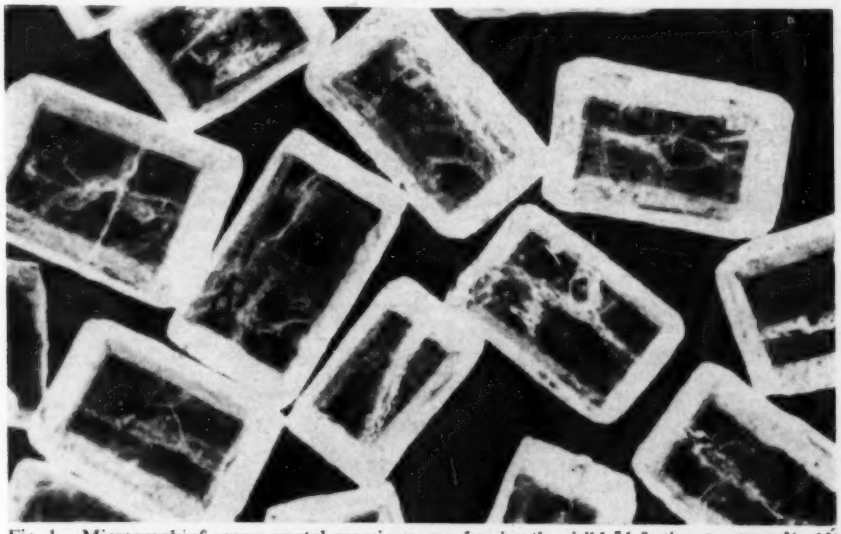
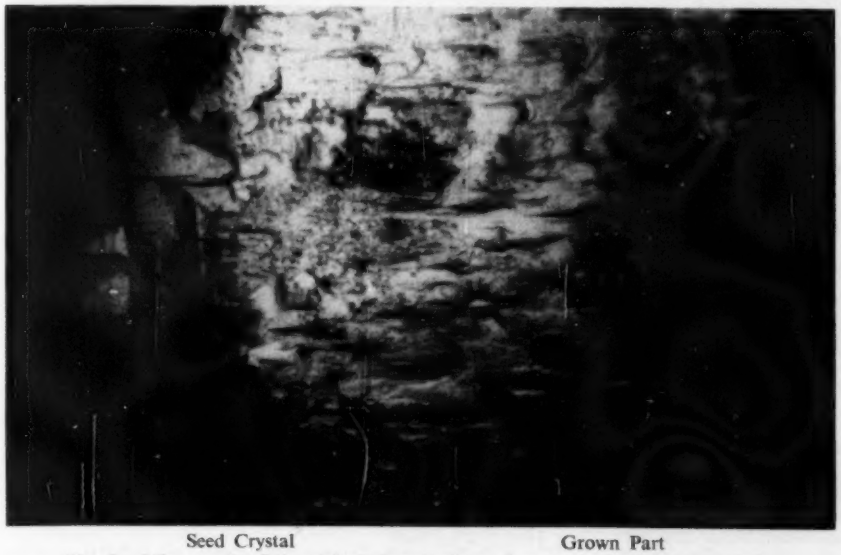


Fig. 1.—Micrograph of coarse crystal superior sugar showing the visibly defective structure. (×10)



Seed Crystal Grown Part

Fig. 2.—Micrograph of the etched cleavage face of candy crystal rugar. (×160).

ALBON and DUNNING[3] reported that the photomicrographs of sucrose crystals growing in pure sucrose solutions or in sucrose solutions containing added glucose or fructose showed growth spirals centred on screw dislocation.

VANHOOK[4] observed the mosaic arrangement of fine crystals in an etched face of a sucrose crystal by means of electron micrography, and in the same way POWERS[5] observed a similar structure on the cleavage face parallel to the (100) plane of a sucrose crystal.

Many X-ray photographs of sugar crystals manufactured by different methods were taken by OBA[6] and he classified them according to the degree of shifting in position, the peripheral widening and asterism of the Laue's spots, as these

[1] This paper was submitted in partial fulfilment of the requirements for the D.Sc. degree.

[2] DEDEK: Paper presented to the 6th Tech. Conf. British Sugar Corp. Ltd., 1953.

[3] *Nature*, 1957, **180**, 1348.

[4] *Proc. Amer. Soc. Sugar Beet Tech.*, 1950, 570.

[5] *Nature*, 1956, **178**, 139; *I.S.J.*, 1956, **58**, 246.

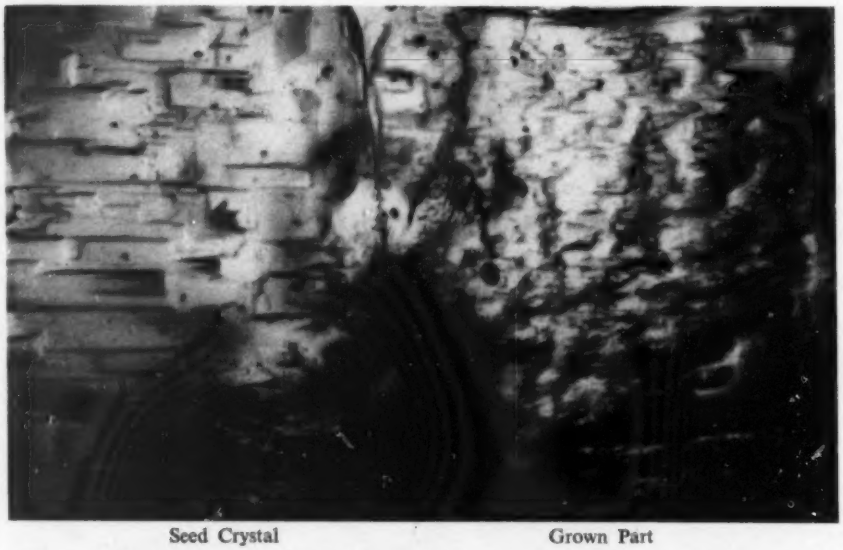
[6] *Research Rpts. Kochi University*, 1955, **4**, (15); *Proc. Research Soc. Japan Sugar Refineries Tech.*, 1957, **6**, 79.

properties showed the mosaic structure of crystals. He concluded that crystal structure was affected by physical stress rather than chemical impurities.

It is impossible to obtain completely flawless sugar crystals in a laboratory or in a refiner because sugar crystals always receive more or less stress on their crystal surfaces, especially in the commercial boiling process, and thus grown crystals have defects in their crystal lattices, resulting in their mosaic structure. Visible defects of the crystal structure, moreover, exist in all sugars of large grain size, such as candy crystal sugar, coarse crystal superior sugar and coarse crystal sugar of medium grade as seen in Fig. 1.

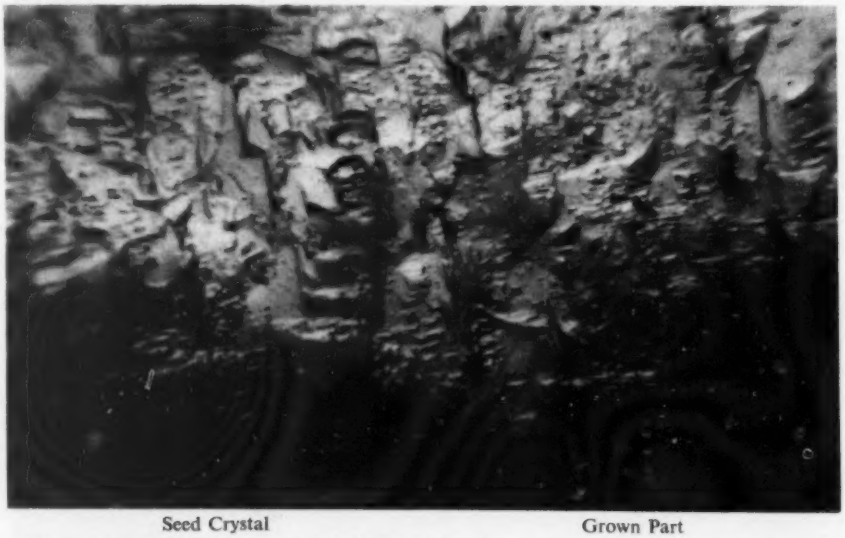
Not only does such a defective structure of crystals remarkably affect the appearance of products, but also an intimate relation seems to exist between imperfection of the crystal structure, the inclusion of impurities within crystals and the physical properties of crystals.

As it is very important to make clear the cause of the visible defect of crystals as well as the properties of their micro defective structure, photomicrographs and electron micrographs of sugar crystals were taken and are illustrated here.



Seed Crystal Grown Part

Fig. 3.—Micrograph of the etched cleavage face of candy crystal sugar showing a crystal cavity. (×160).



Seed Crystal Grown Part

Fig. 4.—Micrograph of the etched cleavage face of coarse crystal sugar superior showing small cavities. (×480).

Experimental

Candy crystal sugar, rock sugar and coarse crystal superior sugar were examined. Candy crystal sugar is manufactured in the form of large single crystals of well-developed crystal faces in a specially designed crystallizer; seed crystals, weighing about 1·5 grams each, are grown in a cylinder-basket in the supersaturated sugar solution (purity 99·9, supersaturation degree 1·05–1·15, temperature 50°C) for one week, the basket being rotated at 1·5 r.p.m. in the crystallizer. The product crystals are 10–26mm in size and 1·8–5·2 grams in weight.

Rock sugar consists of pieces of irregular large crystal lumps and is manufactured by allowing seed crystals to grow in shallow vessels by slow natural evaporation from supersaturated sugar solution at 40–50°C for 10–14 days.

Coarse crystal superior sugar is refined coarse crystal sugar, each crystal being 1·0–2·4 mm in size.

BLAIRS

Sole Makers of
MULTIPLEX FILM EVAPORATORS

COMPLETE

SUGAR

FACTORIES & REFINERIES

DISTILLERIES, ABSOLUTE ALCOHOL & CHEMICAL PLANTS

Our illustration shows a close-up of Cast Steel Gearing on a Blairs 35" dia. × 78" long 12-Roller Milling Plant operating in Brazil.

BLAIRS LIMITED

WOODVILLE STREET · GLASGOW, S.W.1

Cables: "BLAZON, GLASGOW"

London Office: **38 Grosvenor Gardens, S.W.1.** *Cables:* "Multivap, Sowest, London"

SMITH

AUTO FILTERS

DESIGNED BY FILTRATION ENGINEERS TO REDUCE TO A MINIMUM THE COST OF FILTERING AND TO ELIMINATE THE DIFFICULTIES COMMONLY EXPERIENCED WITH OLDER TYPES OF PRESSURE FILTERS

High rates of filtration

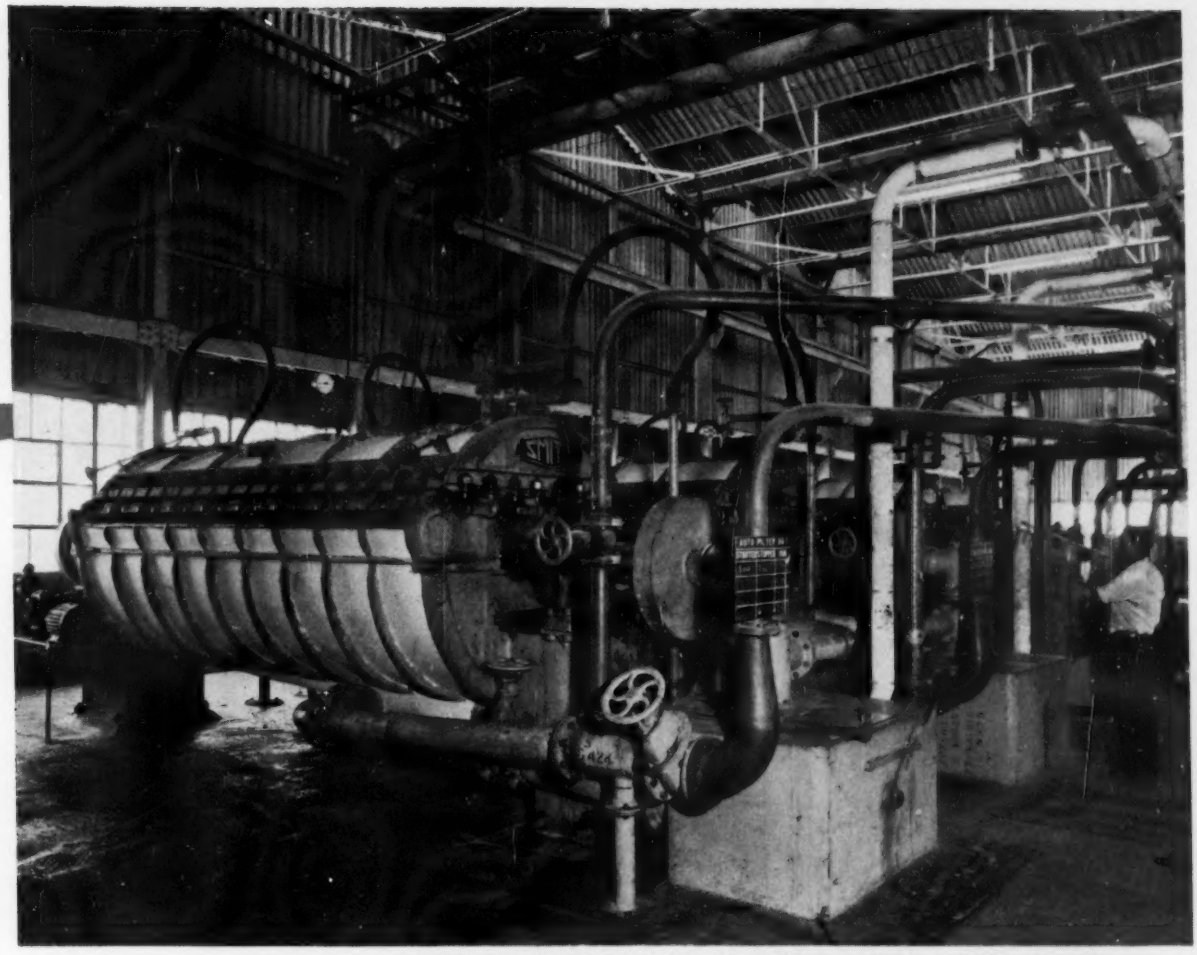
Even deposition of solids

Solids unloaded automatically

Low operating and maintenance costs

Visible filtrate from every leaf

Cleaning time and sluice water reduced to a minimum



AUTO FILTER STATION AT GLEDHOW, NATAL, SOUTH AFRICA.

Four Filters each 1260 sq. ft. surface in the first modern process carbonatation system in Natal.

Publication No. AF-58
available on request

No mechanical wear on cloths

Cloths cleaned without removal

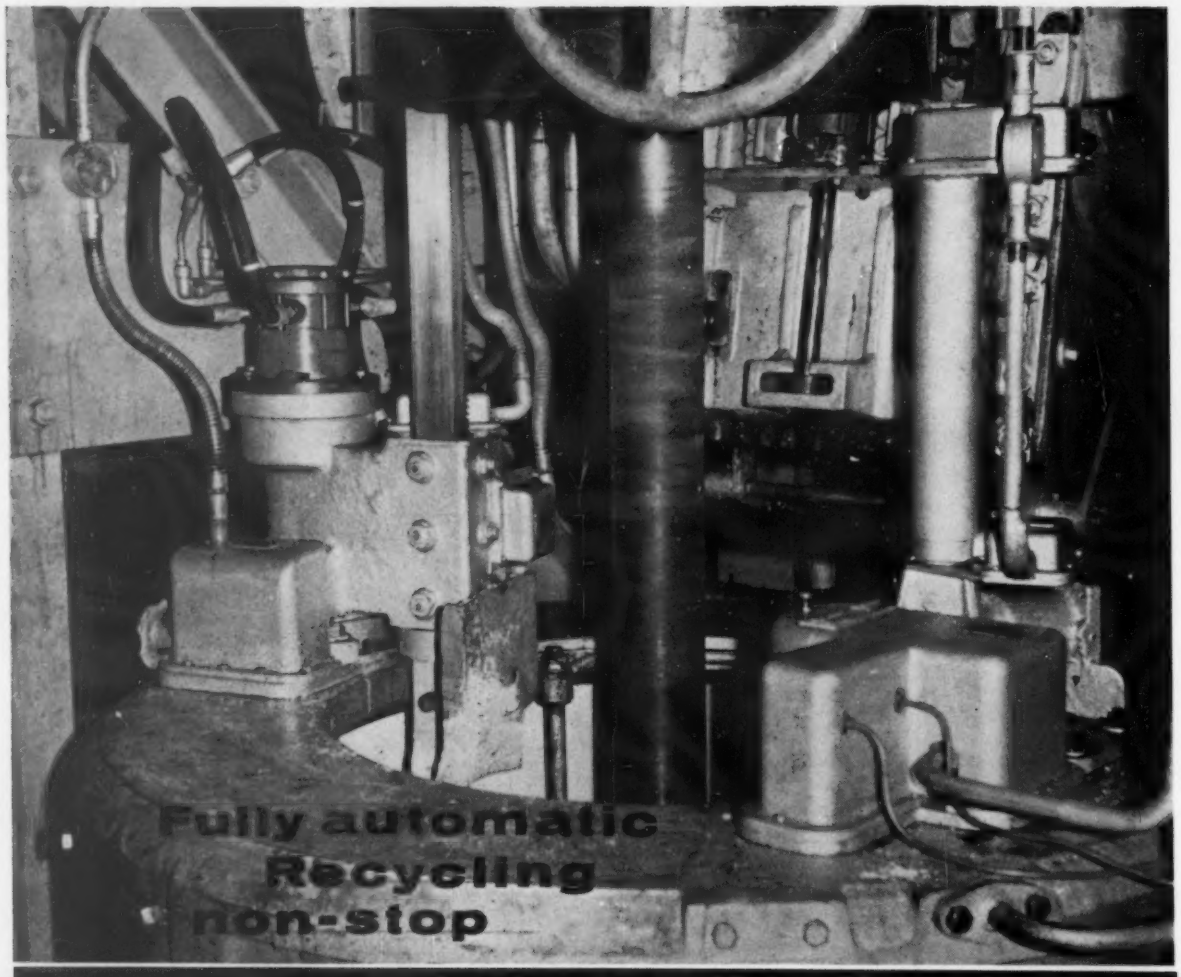
Efficient automatic sluicing gear

Maximum solids in sludge

A. & W.
SMITH
& CO. LTD.
SUGAR FACTORY & REFINERY ENGINEERS
21 MINCING LANE
LONDON · E·C·3
Cable Address: "Sugrengine, London"

WORKS:
COOK STREET
GLASGOW · C.5

Built in various sizes up to 1260 sq. ft. filtering area



CENTRIFUGALS

Continuous operation on all grades of sugar—after-product, raw sugar, affination or whites—is brought to a new level of productive efficiency with this latest Pott, Cassels & Williamson design, one of the best all-round centrifugals available today.

This centrifugal incorporates a complete and fool-proof system of controls with adequate interlocks. It is intended for non-stop working without any operator in attendance, and has been fully tested with complete success.

A catalogue is now available: please write for your copy.

POTT, CASSELS & WILLIAMSON LTD.

A member of THE MIRRLEES WATSON GROUP

MOTHERWELL, LANARKSHIRE, SCOTLAND.

Cables: Pott, Motherwell.

Such coarse crystals are manufactured by boiling three times on fine liquor.

The crystals to be tested were cleaved parallel to the (100) face. After immersing the resulting crystals in water for one second, they were taken out and quickly cleaned by wiping them with filter paper. The samples thus treated were again immersed in 95% ethyl alcohol for 30 minutes and after drying they were examined microscopically.

Seed Crystal Grown Part.

Fig. 5.—Micrograph of the etched cleavage face of a clear crystal manufactured by using seed crystals, having the outer surfaces thereof dissolved previously. (×240).

The technique used for preparing specimens for the electron-microscope examination was as follows: the etched cleavage faces mentioned above were shadow cast with chromium in a high vacuum of 10^{-3}–10^{-5} mm Hg to enhance the contrast and the carbon replicas were then prepared by condensing carbon vapour directly on the cleavage faces. After the sugar crystals were dissolved in water, the carbon replicas were picked up on a specimen screen and washed by soaking them again in water to remove any remaining sugar. The resulting replicas were ready for the electron-microscopic examination.

Fig. 6.—Electron micrograph of the etched cleavage face of coarse crystal superior sugar showing remarkable dislocation. (×4,500).

Results and Discussion

Fig. 2 shows a micrograph of the etched cleavage face of candy crystal sugar, showing the arrangement of crystallites of various sizes. This photo - micrograph is divided into three sections, the left hand section showing the seed crystal which is grown at slow crystallization velocity, and the central and right hand sections showing the parts grown in a crystallizer. The seed crystal used was a piece of rock sugar. The first-mentioned section consists of large crystallites, while the second and third consist of relatively small crystallites. Remarkably irregular arrangement of crystallites is seen in the space surrounding the seed crystal.

Fig. 3 shows a crystal cavity, formed in the border between the seed crystal and the grown part, the mother liquor being included therein. In a high vacuum the included internal water spouts from such a crystal cavity as if it were a volcanic eruption. It is evident that the internal water plays an important rôle in extending the irregular arrangement of crystallites.

Fig. 4 shows the etched cleavage face of a coarse crystal superior sugar, showing small cavities on the border between the seed crystal and the grown part. However both parts are composed of crystallites of about the same size.

As a result of the preceding work, it is concluded that the visibly defective structure of sugar crystals probably results from the following causes :

(1) A remarkable difference exists between the growing conditions for the seed crystals themselves and those for the further grown parts as shown in the case of candy crystal sugar when rock sugar was used as the seed crystal.

(2) All crystals which are purged and dried up, even those in the case of very high grade sugar, have the dried mother-syrup layers all over their surfaces, i.e., the crystallites are not arranged regularly on their surfaces. Therefore, when such crystals are used as seed crystals, the defective structure of crystal may be more pronounced as shown in the surrounding part of the seed crystal of coarse crystal superior sugar.

Fig. 7.—Electron micrograph of the etched cleavage face of coarse crystal superior sugar showing the irregular arrangement of crystallites in the border between the seed crystal and the grown part. (×4,500).

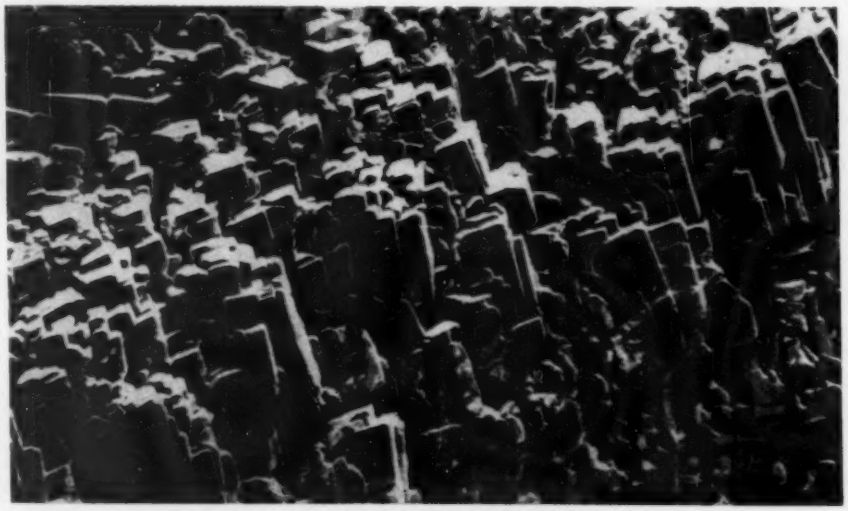


Fig. 8.—Electron micrograph of the etched cleavage face of coarse crystal superior sugar showing the relatively regular arrangement of crystallites. (×,4500).

On the basis of this hypothesis, successful experiments were made to obtain clear crystals, in which the above-mentioned defective structure was not to be observed, as shown in Fig. 5, by using as seed crystals pieces of rock sugar, the outer surfaces of which were first dissolved by dipping them in undersaturated sugar solution, allowing the resulting crystals to grow at 30°C in a solution with a degree of supersaturation of 1·05.

The clear crystals could be manufactured without difficulty by adopting either of the procedures (1),

Less personnel and higher capacity

by

fully automatic BMA - Centrifugals

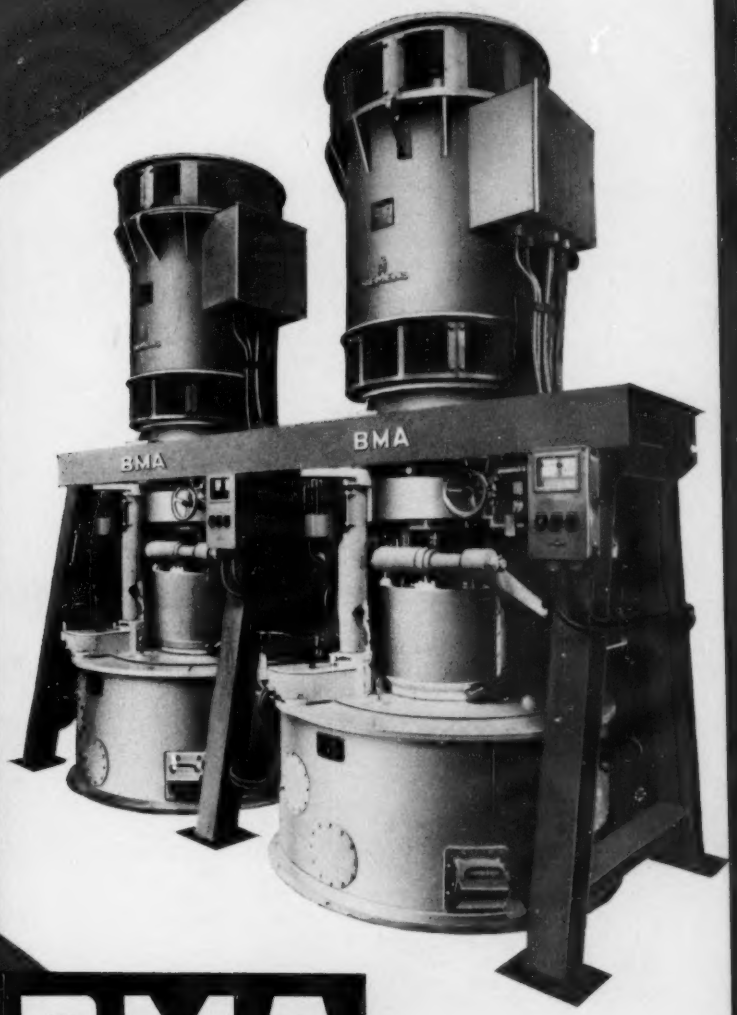
The fully automatic BMA-centrifugals are a matured and clear construction, reliable in operation and usable for all products.

- **Wage saving**
- **more uniform sugar quality**
- **energy saving**

are the decisive advantages.

The complete cycle including filling and discharging process is fully automatized in a simple manner.

Only one supervisor is required for the complete centrifugal plant of a sugar factory.

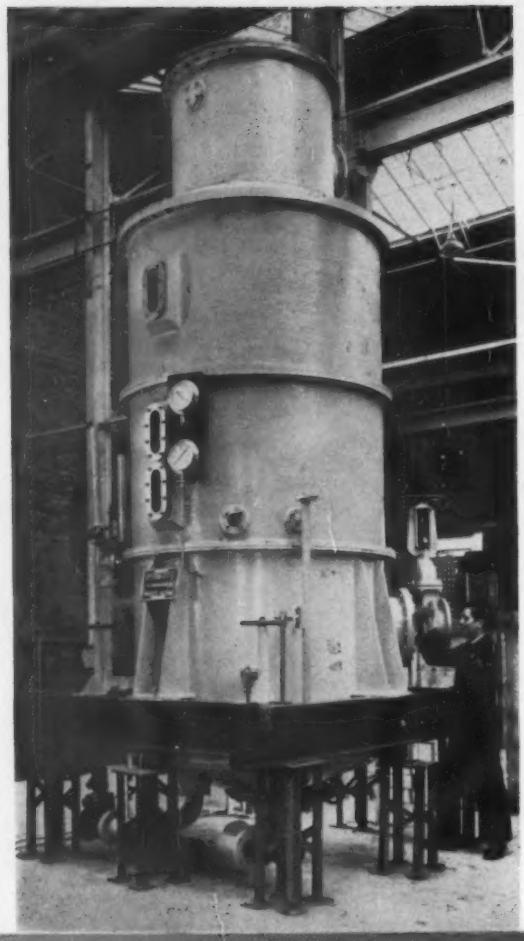


BMA

BRAUNSCHWEIGISCHE MASCHINENBAUANSTALT

BRAUNSCHWEIG / WESTERN GERMANY

Since more than 100 years complete factories for beet sugar, cane sugar as well as plants for alcohol, yeast, starch, fermentation and edible oil.



Evaporators by

* CRAIG

*** manufacturers of machinery for Complete Sugar Factories**

This illustration shows a sugar factory in India. The complete mechanical equipment for this factory was supplied by Craig.

Your enquiries will have our prompt attention.

A. F. CRAIG & COMPANY LIMITED

Head Office and Works: Caledonia Engineering Works, PAISLEY, SCOTLAND
Telephone: Paisley 2191 Telegrams: Craig, Paisley
London Office: 727 Salisbury House, London Wall, E.C.2 Telephone: National 3964

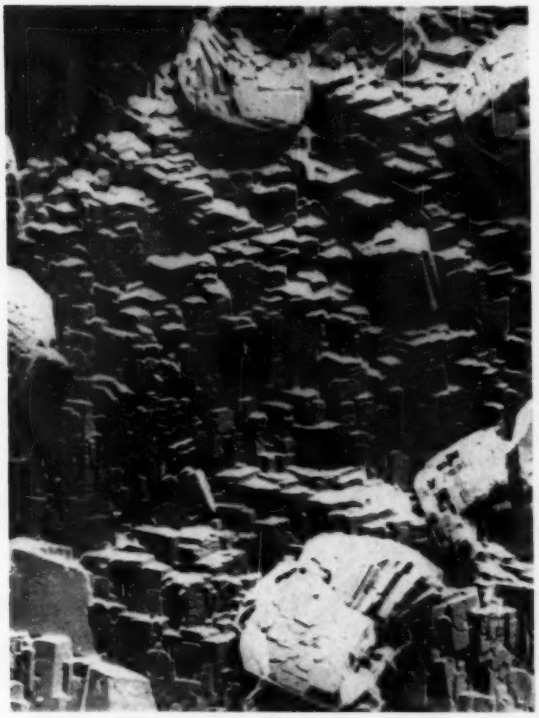


Fig. 9.—Electron micrograph of the etched cleavage face of coarse crystal superior sugar showing the relatively regular arrangement of crystallites. (×4500).

(2) and (3) mentioned below.

(1) Manufacturing coarse crystal superior sugar using coarse granulated sugar as seed crystals, having dissolved the outer crystal surfaces thereof previously ;

(2) Making coarser crystals repeatedly on the footings of magmas of smaller grains, powdered sugar being used as the first seed ; and

(3) Using the shock seeding procedure for graining.

In connexion with the visible defect mentioned above, the present authors studied the fine structures of sugar crystals by means of the electron micrographic method. Figs. 6 and 7 are electron micrographs of the defective structure observed in the part surrounding the seed crystal in a crystal of coarse crystal superior. Fig. 6 shows remarkable dislocation and Fig. 7 shows the irregular arrangement of crystallites of various size in the border between the seed crystal and the grown part. Figs. 8 and 9 show the relatively regular arrangement of crystallites. Most of the crystallites are arranged in one direction, although as seen in Fig. 9 a few large crystallites deviate from this direction.

Recently DATTA[3] commented that the ordinary sugar crystal was not a true crystal but a conglomerate consisting of micro crystals embedded in a matrix of unoriented amorphous sugar in the polymerized phase. In Figs. 6 to 9, the micro defective structures of sugar crystals are shown clearly, but the matrix of amorphous sucrose postulated by DATTA was not observed.

NDOLA SUGAR REFINERY, SOUTHERN RHODESIA

THIS new refinery of Rhodesia Sugar Refinery Ltd., opened in April 1960, has been designed for an output of 30,000 short tons of sugar per annum, but the initial capacity is 20,000 tons, certain plant units for the full output being omitted in the first instance. Site and plant layout have been arranged so that development may be undertaken without interference with production to an output of 60,000 tons per annum. (Fig. 1).

Raw sugar arriving in rail trucks in bags of 200 lb is weighed over two scales, either in single bags or in batches of 6 or 8. The weighed bags are cut and emptied through a grid into a hopper under which runs a conveyor supplying a bucket elevator. Any lumps not passing through the grid are conveniently fed through a small crusher to the hopper. The bucket elevator supplies a steel band conveyor in the apex of the raw sugar store whence movable ploughs direct the raw sugar either on to the storage pile or into the melt bin. The raw sugar store capacity is 5000 tons. (Fig. 2).

Sugar to melt is supplied by a second bucket elevator, at the other end of the raw sugar store, through an automatic bulk scale. This elevator is fed by withdrawal from the melt bin via a scroll conveyor or by reclaim from the store by mechanical shovel; any surplus not required for the melt overflows from the weigher hopper to the melt bin. Reclaim from the store may also take place, if desirable, via the first bucket elevator and the apex conveyor. A brushing machine removes loose sugar from empty raw sugar bags and soaking tanks are provided for bags which have contained wet or caked sugar.

Raw sugar from the melt conveyor passes through crushing rollers to a magma mingler where it is mingled with hot syrup from a tank fitted with a calandria which maintains the syrup at constant temperature. From the mingler the magma flows through to a totally enclosed centrifugal feed trough supplying two centrifugals (with provision for a

[3] *Indian Sugar*, 1957, 7, 327.

third). The centrifugals have 42 in × 24 in baskets and are driven at 1000 r.p.m. by electric motors.

Raw syrup is returned by pumps to storage tanks on the pan floor whence it may be returned to the mingler or proceed via the recovery pans to remelt sugar. Affined sugar is conveyed by scroll to a U-shaped continuous melter where water is added and steam injected. The resultant melt overflows to a vibrating screen strainer whence it is pumped to the carbonatation process supply tank.

Hydrated lime is mixed with water to a density of approximately 7·3 lb CaO/cu.ft. and pumped to storage tanks. From these it is delivered to No. 1 saturation tank via a lime wheel which proportions

KEY :

1 Sugar sidings
2 Coal sidings
3 Spray pond
4 Injection water pump
5 Possible future raw sugar store
6 Raw sugar store
7 White sugar store
8 Loading platform
9 Engineers & Process stores
10 Possible future extension
11 Wood workshop
12 Workshop
13 Coal dump
14 Extension
15 Char house
16 Chimney
17 Extension
18 Site for gas washing plant
19 Boiler house
20 Liquor gallery
21 Switch room
22 Accumulator
23 Molasses tanks
24 Gantry
25 Lift
26 Lime mixing
27 Raw sugar handling
28 Process building
29 White sugar packing
30 Extension
31 Laboratory
32 Gatehouse
33 Office block
34 Substation

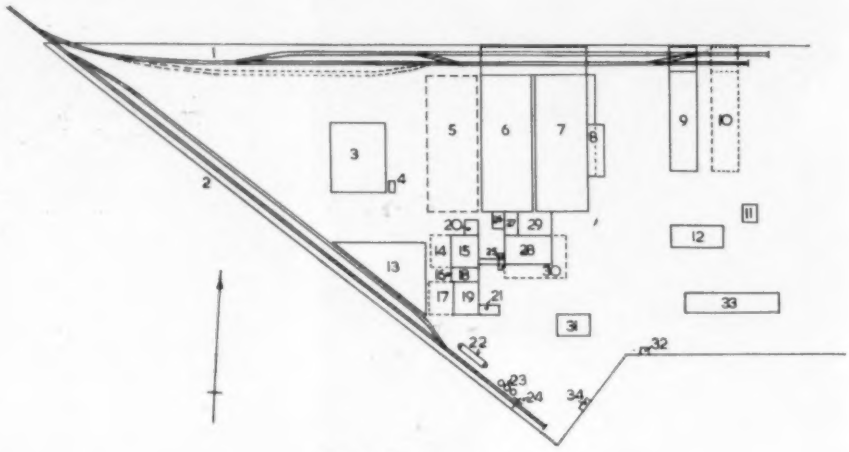


Fig. 1. Refinery site plan.

Fig. 2. Raw sugar store.

TURBINE DRIVE GEAR BOXES
by Duncan Stewart
DUNCAN STEWART & CO LTD.
PARK GATE, GLASGOW C.3.
SIX-650 b.h.p. Gear boxes under construction for South Africa

Suchar ACTIVATED CARBON

effectively eliminates color, taste and odor from sugar

Specifically developed for the cane sugar industry, SUCHAR activated carbon is the best way to remove colors, odors and flavors from sugar liquors.

Amazing surface area and porosity make it the most efficient carbon you can use. And since *less* SUCHAR can treat *more* sugar, it's economical, too. Actually cuts your carbon costs by 10% or more.

For many years, SUCHAR has helped the cane sugar industry produce better sugar with activated carbon, Auto and FAS-FLO* Filters and expert engineering service. We'll be pleased to help you. As a start, let us quote on your requirements.

*Reg. TM of FAS-FLO Filter Corporation, New York

SUCHAR SALES CORPORATION

CONSULTING ENGINEERS

76 Beaver Street
New York 5, N. Y.

Cable Address: "SUCHARING" N.Y.

EXCLUSIVE DISTRIBUTORS OF SUCHAR ACTIVATED CARBON FOR THE CANE SUGAR INDUSTRY

the lime to the rate of liquor flow. The gas from the boilers is washed in a scrubbing tower and pumped by liquid-sealed compressors to the saturation tanks. Liquor is gassed continuously in its passage through No. 1 and No. 2 saturation tanks to the "Autofilter" supply tank. In the 2nd saturation tank the liquor is raised to 85°C by means of a calandria. Surplus gas is recycled.

The carbonatated liquor is filtered through two 900 sq.ft. leaf filters and pumped to the char supply tanks. Sluicings are filtered and sweetened-off on two plate and frame filter presses. The mud is conveyed to a mud disposal hopper whence it is removed by road transport.

Fig. 3. Internal view of the white sugar annexe showing the aluminium storage hopper of 190 tons capacity, the small mixing hopper for lower strikes holding 17 tons, and the scalper screen.

Clear liquor from the filters is fed via a gravity supply tank to six char cisterns, each of 650 cu.ft. capacity and 8 ft in diameter, with a cone bottom terminating in a 3 ft. 6 in. diameter outlet. This has a removable door held in position by swing bolts, suitable recessed to contain a strainer plate and two woven wire cloths. A flexible hose is provided to lead the decolorised liquor to the pan supply tanks.

To empty a cistern of char, a trolley running on channel rails is positioned under the cisterns and hydraulic jacks fitted to this trolley take the load off the discharge door bolts which are then slackened and swung clear. The jacks are then released, lowering the door onto the trolley, which is then moved along the rails by a winch, allowing the char to flow out by gravity into the discharge hopper below.

The char is revivified in conventional manner by one Scotch kiln with stainless steel retort tubes and Gothic pipe dryer. (Provision has been made for future installation of a further kiln.) The kiln, usual elevators, conveyors, storage bins, dust removal screen, etc., have been arranged in a compact and easily operated form in a separate building.

The fine liquor from the char house is pumped to the pan supply tanks and boiled in a 600 cu.ft. stainless steel clad pan of 850 sq.ft. heating surface. The resultant massecuite passes through a crystallizer and feeding trough to two 42 in × 24 in centrifugals, electrically driven at 1000 r.p.m. The spun sugar is fed to a conventional-type rotary dryer using hot air as the drying medium and thence to the packing station by means of a belt conveyor. A bucket elevator receives sugar from the conveyor and transfers it to an aluminium silo with provision above the silo for the future removal of caster sugar through a vibrating screen. Sugar from the elevator may be diverted to a mixing bin of one strike capacity. This bin returns sugar to the bottom of the elevator for the purpose of mixing in sugar from lower boilings with sugar from 1st boiling in order to provide for a uniform quality of final product.

Sugar from the silo passes through a scalping screen to the following packing station which includes two valve packing machines for 100-lb paper sacks, one open-mouth sack filler for 25-lb and 50-lb paper sacks and 100-lb hessian sacks, and one automatic packaging machine for 4-lb paper bags and a baling machine to make up bales of ten 4-lb packets.

Packed sugar is stored in a shed of 2500 tons capacity whence it is removed either by road or rail transport vehicles. The layout of the white sugar packeting arrangements has been arranged to provide for the future installation of a 2000-ton storage silo for granulated sugar to act as a buffer between the dryer and the packaging station.

Two 450 cu.ft. vacuum pans with tubular calandrias and independent air pumps and condensers handle the 1st, 2nd and 3rd crop syrups. The pan chiefly used for remelts and 1st crops has a heating surface of 650 sq.ft. and that used principally for 2nd and 3rd crops has a heating surface of 500 sq.ft. Seeding of first crop strikes is by means of single einwurf seeding using 2nd and 3rd crop sugar.

Four naturally-cooled crystallizers receive sugar from the pans, one principally for remelt of 1st crop strikes and the other for three 2nd and 3rd crops. Flexibility is provided by arranging that either pan may discharge into any crystallizer.

Remelt and first crop strikes pass via a feeding trough to one 42 in × 24 in 1500 r.p.m. centrifugal, provision being made for a second. The spun sugar is conveyed to the affination melter.

Second and 3rd crop strikes pass through a static masse reheater to a 42 in × 24 in 1500 r.p.m.

centrifugal (with provision for a second) and the spun sugar mingled with raw syrup and pumped to a seed mixer on the pan floor. Syrups from the centrifugals are pumped to overhead storage tanks on the pan floor. Final molasses is pumped to overhead storage tanks adjacent to the railway sidings whence it may be delivered to rail or road transport vehicles.

Steam is provided by two "Economic" coal-fired boilers of 12,500 lb/hr continuous maximum rating at 250 p.s.i. steam pressure. Steam is supplied to process at 30 p.s.i. through a reducing valve. Surplus steam passes to a steam accumulator whence low pressure steam is automatically supplied to the process range during periods of peak pressure load.

All power is supplied by the Ndola Electricity Undertaking, but provision has been made to add a power station to the refinery should future circumstances justify the capital expenditure. Water is supplied by the Ndola Municipality. The boiler feed water is treated and heated before entering the boilers. The condenser water is recycled through a spray cooling pond.

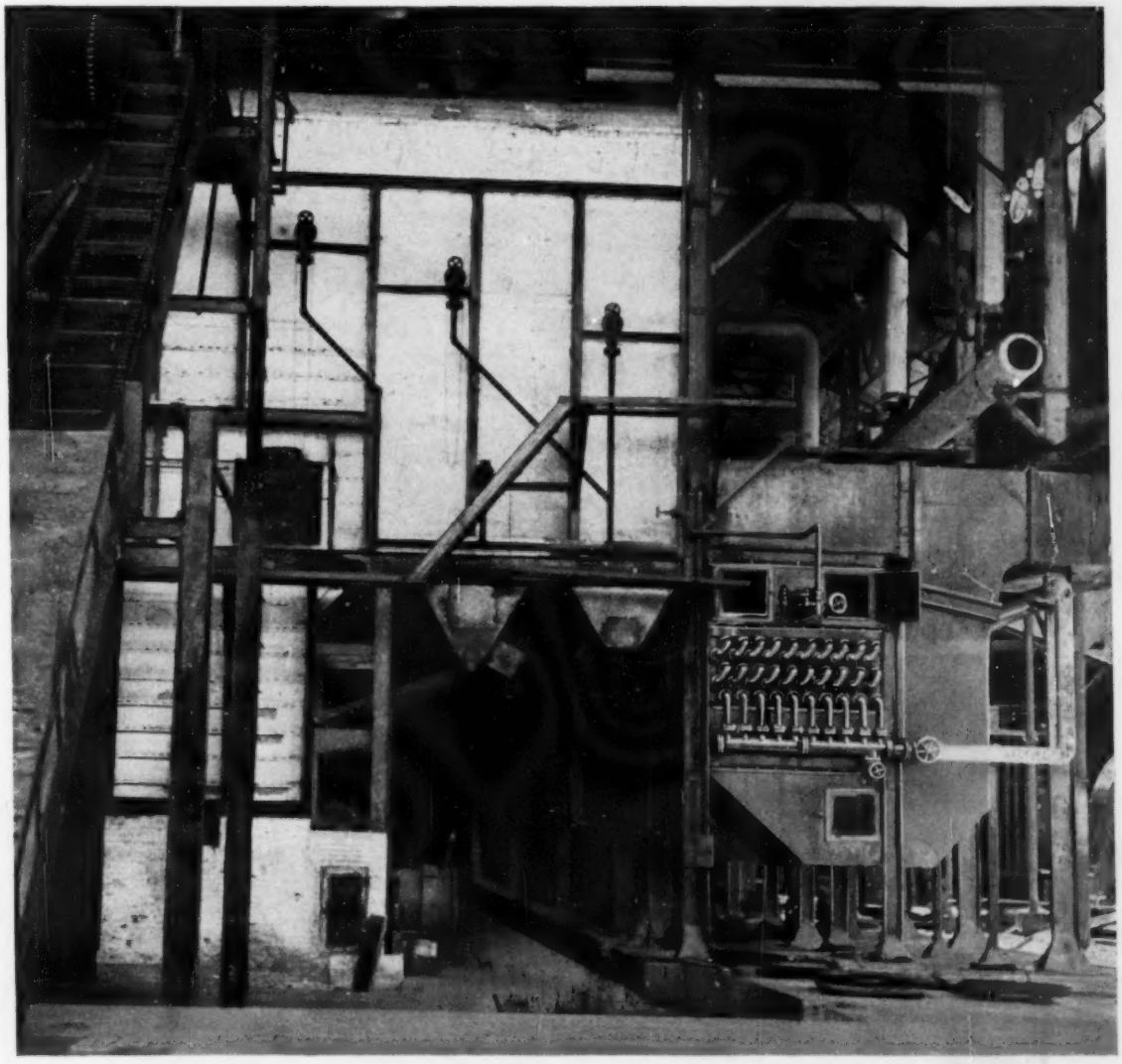
The Company has erected its own European and African houses within the municipal area at an estimated total cost of about £200,000. These houses are provided for the staff at sub-economic rents.

Fig. 4. Internal view of the white sugar store.

Fig. 5. General view showing the boiler house and switch room, the 120-ft. high chimney, the char house, process building and a corner of the raw sugar store.

Consultants and plant designers for the refinery were Tate & Lyle Technical Services Ltd. and the machinery has been supplied by A. & W. Smith & Co. Ltd. The estimated cost is £1,151,000.

More steam with a GREEN'S ECONOMISER



E. GREEN & SON LTD
WAKEFIELD

Makers of economisers for more than one hundred years

If you are pressed for more steam (or find the need to save supplementary fuel) a Green's Economiser installation can assist at a cost which shows a handsome dividend on the outlay.

Installed at Nicaragua Sugar Estates Ltd.

GE 192

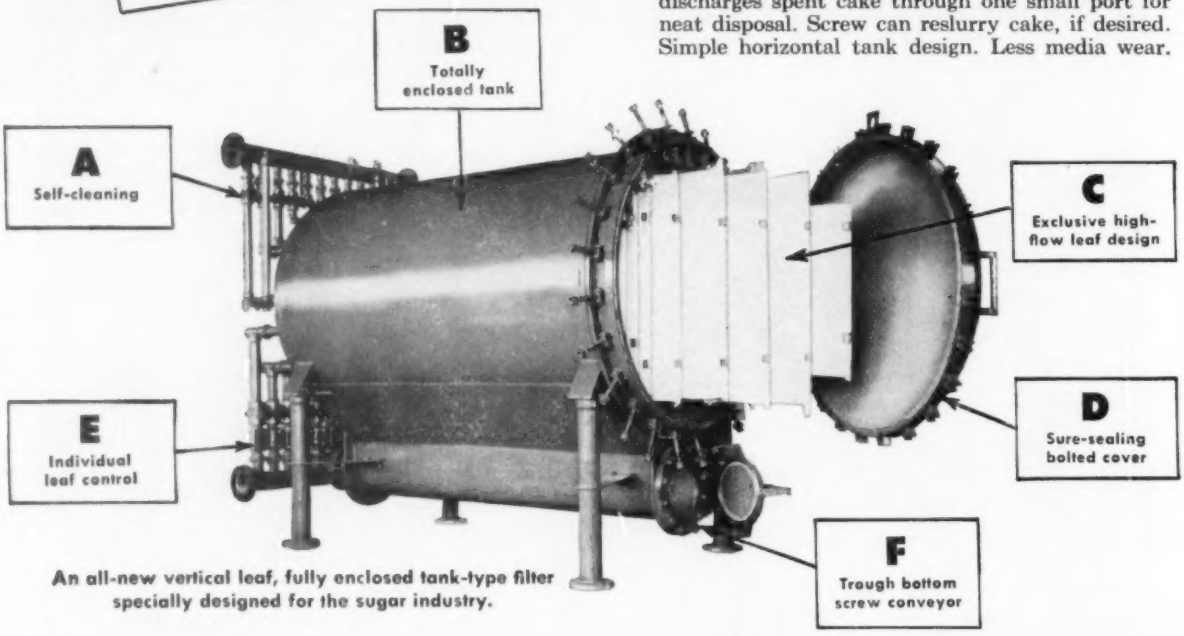
SPARKLER *Presents* NEW SUGAR FILTER MODEL RSC

EXCLUSIVE OPERATING ADVANTAGES

Greater Clarity Control—Sight glasses, sample cocks and individual control valves for each leaf provide continuous clarity control. Should any leaf not function properly, it may be shut off without interrupting operation.

Minimum Manpower Required—A single non-skilled individual is capable of operating a large battery of RSC filters including filter aid addition, cleaning, precoating and supervising.

Faster Cleaning, Easier Maintenance—A 560 sq. ft. Model RSC can be cleaned in 10-15 minutes (30-45 minutes total down-time). Leaves are sprayed clean individually. Screw conveyor in trough bottom discharges spent cake through one small port for neat disposal. Screw can reslurry cake, if desired. Simple horizontal tank design. Less media wear.



An all-new vertical leaf, fully enclosed tank-type filter specially designed for the sugar industry.

Exclusive Design Features

A Internal sprays sluice filter. Can be independently valved for individual operation under low pressure conditions.

B No leaking, dripping or air-borne contamination. Assures a neat filter station with clean, sanitary service. Filter may be insulated to minimize heat loss. Can be installed in low headroom, small floor space areas.

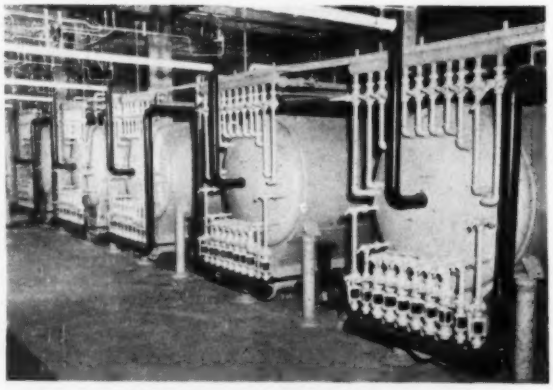
C Vertical rectangular leaf design assures maximum flow per filtering area and even precoating. Unexcelled rigidity and durability. Hung on roller carriages for easy individual inspection or removal, no bolts or fastenings. Self-sealing in filter. Stainless steel leaves covered with long-life synthetic cloth or stainless steel wire screens.

D Bolted cover on double-hung hinge provides full access to interior without leaf removal. Hydraulic quick-opening cover optional.

E Individual plate outlet control valves, sight glasses and sample cocks. Any plate or plates may be shut off without removing filter from service.

F Trough bottom with screw conveyor discharges cake neatly and quickly without opening tank. Cake can be reslurried if desired.

SIZES UP TO 1020 SQ. FT. OF FILTERING AREA



A battery of five 300 sq. ft. Model RSC filters in operation at Union Sugar Co., Betteravia, California, U.S.A.

Address all inquiries to Sugar Department

SPARKLER

MANUFACTURING CO., Conroe, Texas, U.S.A.

Sparkler International Ltd., Lelliegracht 9, Amsterdam-C, Holland
Manufacturing plants in Canada, Holland, Italy and Australia

Filtration engineering and manufacturing exclusively for over 30 years

Evaluating plantation white sugar by colour values. W. CHEN. *Taiwan Sugar*, 1959, **6**, (9), 27–28.—With reference to C. A. LEE's advocacy of plantation white sugar (SWC) manufacture instead of refined sugar[1], it is pointed out, with the aid of data on colour and ash content of SWC sugar from 15 mills[2], that manufacture of white sugar of sufficiently high quality (as judged by its colour value) is possible under suitable conditions, such as proper liming and CO_2 retention, good cane quality and adequate manufacturing equipment, etc. It is ruled out in mills crushing poor quality cane with deficient equipment.

* * *

Factory research in Hawaii. *Rpt. H.S.P.A. Expt. Sta.*, 1959, 21–24.—Cane has been prepared for diffusion in the Silver D.d.S. diffuser[3] at Kekaha by a two-stage process. A Rietz "prebreaker" reduces the cane to a "satisfactory" length, but as 25% of the pieces are still too large for diffusion, it must be passed through a Rietz disintegrator, a vertical swing hammer mill. The equipment handles 20 tons per hr. A Gruendler shredder has been tested and could possibly replace the "prebreaker", although the cane tends to be too long and of too low a density. Stoppages longer than 5 min in the supply of cane from the cleaning plant have made it difficult to keep the diffuser completely filled, so that channeling has occurred with excess water usage and low capacity, with increased juice dilution. Improvements have been effected by installing a chopped cane storage hopper with a 5-min supply capacity. Average performance data for two months are: 13·2 t.c.h., 0·55 bagasse pol and 94·5 extraction, with the highest throughput at 17·8 t.c.h. and the longest continuous operation for 3 days at 16 t.c.h. Best daily extraction was 97·0. Dilution has been high owing to discontinuous operation, although it was 40% on absolute juice during the 3-day run. The radio-caesium bagasse weigher[4] operated continuously throughout the season. Random readings showed an error for a 10-second sample of $\pm$1·8 tons bagasse/hr, which is $\pm$4·4% of the average flow rate, although the error would be reduced over the period of one hour to possibly $\pm$0·23%. At Hutchinson Sugar Co. Ltd. the settling rate of limed and heated juice was increased 5–10 times by using 2 p.p.m. of "Separan AP–30" polyelectrolyte, although clarity was only sometimes improved. In other tests "AP–30" gave approximately the same settling rate as "ET–81", but better clarity. Maximum clarity was achieved when the polyelectrolyte was added to the clarifier flash tank. A laboratory unit has been installed for instrumental control of the Ionics Inc. electric demineralization plant at Puunene[5]. A technique of detecting the polarization potential is being developed, with control of the process below this. Froth clarification of syrup and molasses does not improve its quality; although it increased filtrability, it always increased the colour, apparently owing to the action of heat and aeration. The crystallization rate of sucrose in the presence of lime decreased by 56%, possibly owing to the effect on pH; potassium and sodium carbonate both retarded crystallization, by 85–86% at 3% concentration. "Hodag CB–6", a commercial surface-active agent, had no appreciable effect, while raffinose decreased the rate by 23% at a concentration of 0·18%. Pectic acid only slightly retarded crystallization. For studies of the crystallization rates of syrups and molasses a miniature laboratory vacuum pan has been designed and is illustrated. Spectrophotometric measurements in the visible spectrum have shown a colour decrease corresponding to a decrease in crystal size from the same strike and plantation. Analyses at Lihue show that about 40% of the variation in colour can be attributed to size. A highly significant correlation was also found between crystal size and filtrability, the correlation between crystal colour and filtrability being less significant. Thermal decomposition products and melanoidins, formed by glucose and degradation products reacting with amino acids, are responsible for some of the colour in the raw sugar crystal. This was revealed by synthesizing the substances and comparing the transmittancy curves with those for raw sugar crystals. The curves appeared the same qualitatively. The colour of the thermal decomposition products, however, was greater at higher pH values, whereas the colour of the melanoidins changed little with pH increases.

* * *

Studies on the storage life of jaggery—note on a quick and simple method of assessing the comparative keeping quality of various packaging materials. P. V. SURYA PRAKASA RAO and N. V. MOHAN RAO. *Indian J. Sugarcane Res. Dev.*, 1959, **3**, 156–158.—The relative keeping properties of jaggery is indicated by weight increases per unit time. The resistance of various packaging materials to moisture absorption can be calculated from $W = P \cdot A \cdot t \cdot \delta p$, where W = increase in weight of the sample, P = permeability, A = surface-area of exposed sample, t = temperature, and δp = difference between vapour pressure of sample and of surrounding atmosphere.

[1] *I.S.J.*, 1959, **61**, 252.
[2] *I.S.J.*, 1960, **62**, —.
[3] *See I.S.J.*, 1959, **61**, 142.
[4] *See I.S.J.*, 1957, **59**, 251.
[5] *See also I.S.J.*, 1957, **59**, 250; 1958, **60**, 365.

Research on sugar refining. XX. Impurities of raw sugars and refinery final molasses. M. KOMOTO, T. MAEDA and S. FUJII. *Sci. Rpt. Hyogo Univ. Agric., Ser. Agric. Chem.*, 1958, **3**, 101–108; through *S.I.A.*, 1959, **21**, Abs. 955. **XXI. Activation of pine coal by the steam method**[1]. T. SIMIZU and H. KOZIMA. *ibid.*, 109–112; through *S.I.A.*, 1959, **21**, Abs. 891. **XXII. On the colour adsorbed by "Amberlite IRA 410" from raw sugar.** S. SAKAI and T. SIMIZU. *ibid.*, 112–118; through *S.I.A.*, 1959, **21**, Abs. 956.

XX. Analyses (moisture, reducing sugars, nitrogen, ash etc.) were made of raw cane sugars and refinery molasses, and of the sediments obtained on settling (24 hr) diluted molasses, or on settling raw sugar solutions or molasses after addition of ethanol. The sediment obtained with 50% ethanol was fractionated by successive extrations with cold water, hot water, 0·5% ammonium oxalate solution, and 5% NaOH solution. On hydrolysis of the fractions and paper chromatography of the products, arabinose, galactose, xylose and glucose were detected. A graph is given showing the effect of pH on the % sedimentation. Lead sub-acetate precipitated about 80% of the colouring matter in molasses. On treatment of the sediments with H_2S, filtration, and extraction of the filtrate with ether (to remove aconitic acid), eight colouring matters could be separated by paper chromatography; their hygroscopicities, solubilities in different solvents, and the precipitability by $Ca(OH)_2$, $Ba(OH)_2$ or $(NH_4)_2SO_4$ are tabulated. The products of oxidation of the colouring matters by HNO_3 were also examined.

XXI. Pre-treatment of pine coal by immersion in dilute nitric or sulphuric acid, before steam activation, accelerated the activation and resulted in increasing decolorizing power. The best results were obtained by immersion in 10 vols. of 0·1N HNO_3 for 10 hr, causing moderate oxidation, after which the decolorizing power of the activated carbon was 20% greater than that of carbon without the pre-treatment. Subsequent washing with 1N HCl also improved the product. The use of HCl or NaOH for the pre-treatment had no effect.

XXII. The colouring matters eluted from the resin, by the salt solution used for washing it, were concentrated under vacuum and extracted by 99% alcohol, phenol and acetic acid, and examined by paper chromatography. The separated colouring matters were hydrolyzed with mineral acid, and the 2,4-dinitrophenylhydrazones were prepared. Eight colouring matters were characterized by their solubility, three being soluble in ethanol (A_1, A_2, A_3), three in phenol (B_1, B_2, B_3), and two in acetic acid (C_1, C_2). They showed absorption maxima in the ultra-violet at A_1:273 mμ; A_2: 260 mμ; B_2: 269–270 mμ; B_3: 269 mμ, and these are therefore considered to be carbonyl compounds. The hydrolysis products each contained several substances giving a positive ninhydrin reaction, and one or two reducing substances as shown by the aniline phthalate or benzidine reaction. The 2,4-dinitrophenylhydrazones showed absorption maxima at B_1: 258 mμ and 335 mμ; B_3, C_1 and C_2 359 mμ; A_3, B_2: 360 mμ; A_1, A_2: 370 mμ. These colouring matters were thus considered to be nitrogen compounds condensed with polymerized aldehydic or ketonic compounds.

* * *

Refining of sugar. XVIII. On the reaction between amino acids and sugars. I. T. SHIMIZU and S. SAKAI. *J. Agric. Chem. Soc. Japan*, 1958, **32**, 506–510; through *S.I.A.*, 1959, **21**, Abs. 958.—The reactions of glucose or fructose with amino acids under conditions similar to those of the carbonatation process have been studied. The coloured compounds formed when 0·04M sugar solutions and solutions of 0·05M glutamic acid, 0·005M aspartic acid or 0·008M alanine were heated to 60°C at pH 8-11 for 5–48 hr were analyzed with the use of spectrophotometry and paper chomatography. The compounds formed possessed an absorption maximum at 265 mμ and the presence of substances which react positively with ninhydrin and which have absorption maxima at 247 and 287 mμ were detected. It is suggested that ammonia from the amino acids reacts with decomposition products from the sugars to form N-glycosides. The pH of the mixed solutions is lowered as the reaction proceeds; the rate of pH lowering and the amount of browning are greater with glucose than with fructose. NaCl and Na_2SO_4 (0·001M solutions), or $FeCl_3$ and $Fe_2(SO_4)_3$ (0·0001M solutions) all act as negative catalysts to the reactions; an exception is the reaction of aspartic acid with either glucose or fructose in the presence of $FeCl_3$.

* * *

A new process of selective cane juice clarification applied in Central Cortada for the 1959 season. M. BALLESTER. *Paper presented to the Ann. Meeting, Asoc. Técn. Azuc. Puerto Rico*, 1959.—The use of "Elguanite" in clarification was thought, as the result of tests in 1950, to be uneconomic in the case of clean juices, while difficulties would be caused by the quantity of impurities introduced in the juice as a result of field mechanization, and its detrimental effect on viscosities would lower molasses exhaustion. Tests on the process described previously[2] have been carried out at Central Cortada in 1959 and show that these effects do not occur. Satisfactory improvement in clarification with a 7½-fold increase in settling rate was achieved by the use of only 0·6 lb of "Elguanite" per ton of cane compared with 2 lb used at Central Machete in 1958. When bad weather caused an increase in the dirt content of juice it was found that the use of a combination of "Separan AP-30" with "Elguanite" was more effective than a combination with lime. Central Cortada had previously produced final molasses of 35–38 purity, mostly nearer the higher figure; when using "Elguanite" the purity dropped to about 32 and occasionally reached 27–29. The preservative action of "Elguanite" was confirmed; on one occasion juice was left in the clarifiers for 58 hr during a shutdown without appreciable loss by inversion.

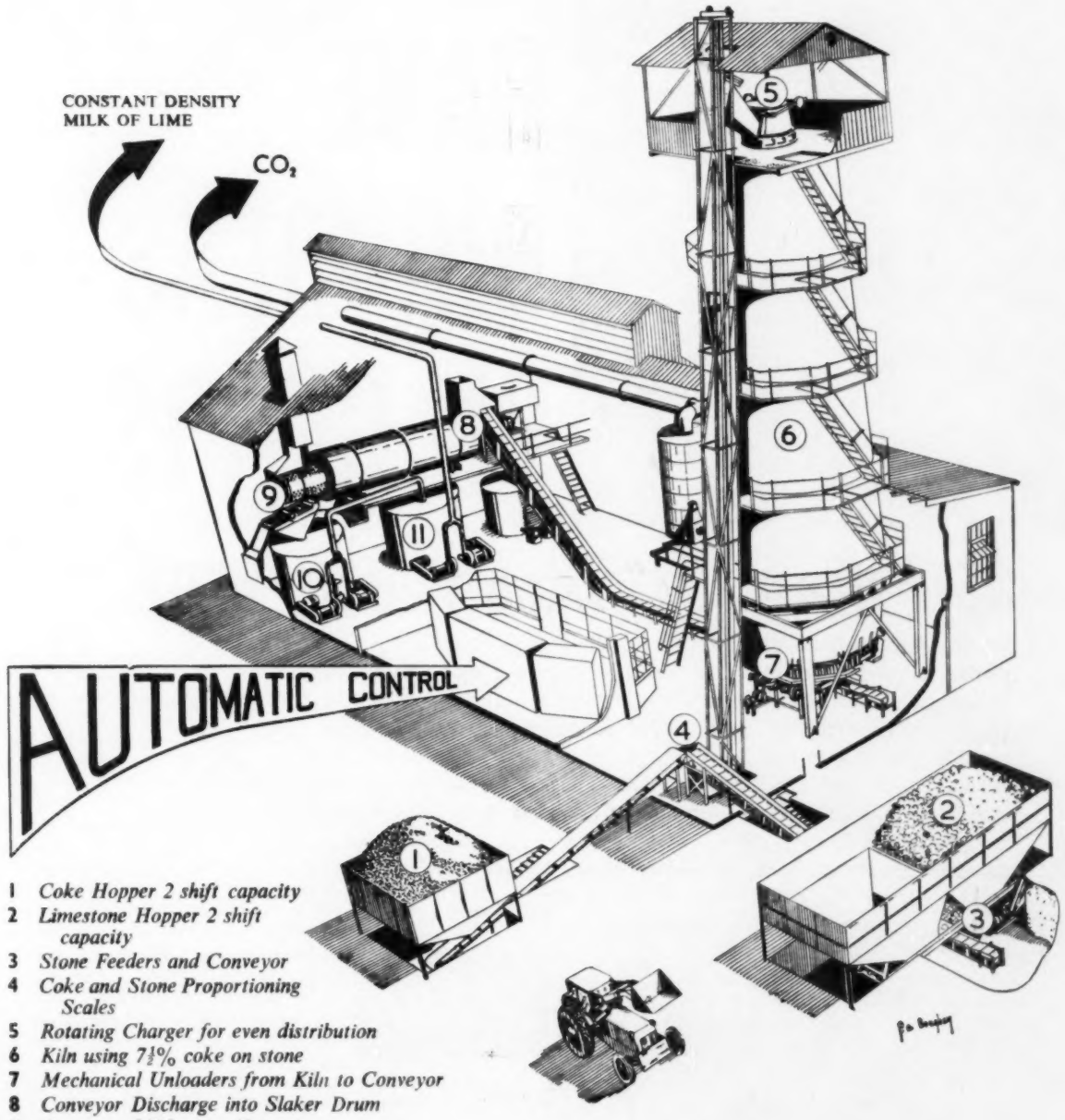
[1] *See also I.S.J.*, 1959, 61, 304.
[2] *I.S.J.*, 1959, **61**, 369.

CONSTANT DENSITY

MILK OF LIME PRODUCTION

USING ONLY ONE OPERATOR PER SHIFT

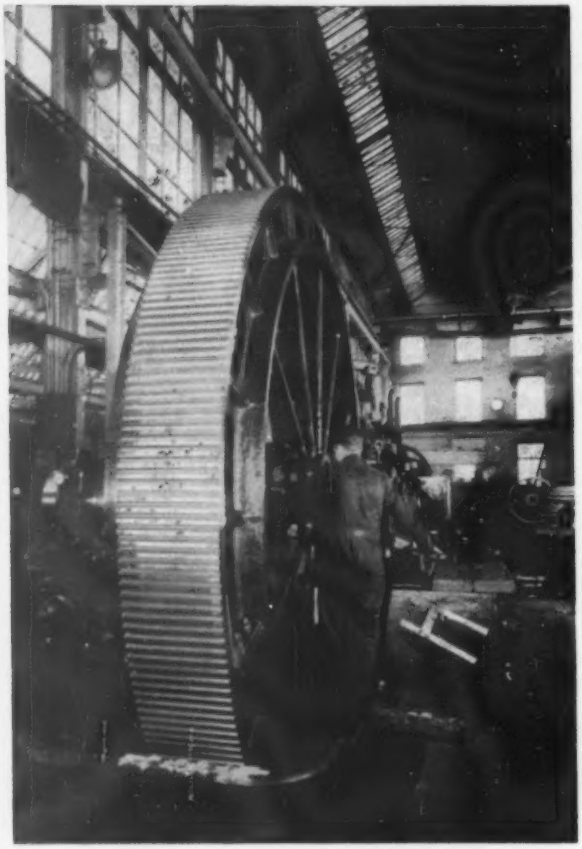
AS SUPPLIED TO THE BRITISH SUGAR CORPORATION



1 *Coke Hopper 2 shift capacity*
2 *Limestone Hopper 2 shift capacity*
3 *Stone Feeders and Conveyor*
4 *Coke and Stone Proportioning Scales*
5 *Rotating Charger for even distribution*
6 *Kiln using 7½% coke on stone*
7 *Mechanical Unloaders from Kiln to Conveyor*
8 *Conveyor Discharge into Slaker Drum*
9 *Rotary and Vibrating Screens*
10 & 11 *Milk of Lime Density Correction and Storage Tanks*

COCKSEDGE & Co LTD

Telephone: Ipswich 56161 (5 lines) IPSWICH . ENGLAND *Telegrams:* / *Cables:* Cocksedge, Ipswich



CROFTS HAVE BIG IDEAS ON GEARS

185" diam. 37" face width. 5" CP.

We often find ourselves in this kind of company, because we specialise in heavy industrial gearing, Spur and Helical (Single and Double) for rolling mill equipment, steelworks plant, sugar and cement mill drives.

We do, however, spend much of our time in lesser company, as large-scale manufacturers for all branches of industry.

Our wide STOCK RANGE includes Spur and Mitre Gear Drives up to 70 H.P. and Bevel Gears up to 44 H.P. In addition, we produce Internal Gears, Racks and Pinions, Worms and Wheels, Spiral Bevels and Spiral Mitres.

Customers' blanks can also be cut, and gears manufactured to special order.

Write for our handy illustrated pocket-size catalogue, giving complete details and tables.

Post this coupon Today!

CROFTS (ENGINEERS) LIMITED

POWER TRANSMISSION ENGINEERS

THORNBURY BRADFORD 3 YORKSHIRE ENGLAND

Phone: 65251 (20 lines) Grams: 'Crofters Bradford Telex' Telex 51186

Crofts

Please send me Publication 159
'MACHINE CUT GEARS'

Name .....

Address .....

.....

ISJ

Branches at: Belfast Birmingham Bristol Cardiff Dublin Glasgow Ipswich Leeds Liverpool London 'Manchester Newcastle Northampton Nottingham Sheffield Stoke-on-Trent. Subsidiary Companies in Canada South Africa, U.S.A. World-wide Representation.

BEET FACTORY NOTES

New information on the coke-fired lime kiln. H. EIGEN. *Zucker*, 1960, **13**, 6–12.—A new formula is presented for calculation of the heat requirements (X) per kg lime, based on the temperature difference (Δt) between gas (t_g) and limestone (t_m) at the boundary between the preheating and deoxidizing zones:

$$X = \frac{p\,(7{\cdot}51 + 0{\cdot}00204\,\Delta t) - 211 + W_1 + P}{1{\cdot}070\,n - 0{\cdot}379 - \Delta t(0{\cdot}000387\,n + 0{\cdot}0000329)}$$

where p = % lime as free CaO (+MgO), W_1 = loss of heat at kiln wall, P = lime heat loss, and n = actual air factor[1]. A 50°C increase in Δt means in practice an increase of 60 kcal/kg lime in the heat requirements. The lower the value of Δt, the longer the time required for pre-heating of the limestone. This time will be extremely long and the pre-heating zone very high for large limestone of >150 mm. As an increase in the lime production per sq.m. kiln cross-section increases the value of Δt so much more with larger limestone, a high cross-sectional capacity can be linked with a low heat requirement only if the limestone is below 150 mm. The heat consumption per kg free CaO is greater and the maximum attainable heat efficiency is lower, the greater the value of Δt and the higher the content of lime as free CaO.

* * *

Recycling sugar factory waste waters. F. EDELINE, I. BEECKMANS DE WEST MEERBEECK and R. HEUZE. *Sucr. Belge*, 1960, **79**, 181–191.—Comparative studies were made on waste water treatment in two factories; in one factory (A) the water was limed to pH 12, while in the other (B) it was chlorinated. The lime dosage was 2·03 tons/1000 tons beet (considered excessive) compared with an average of 80 kg of Cl_2 per 1000 tons of beet. While the lime provided adequate protection of the organic substances against decomposition, even up to 1 year after dosing, the effect of the chlorine is weakened through its rapid reduction by the inorganic substances in the water. The lime gives far greater flocculating, and therefore settling, efficiency than the chlorine, at least 1·0 sq.m./cu.m. water/hr settling surface being needed with the latter, compared with 0·108 sq.m. with the former. Of the dissolved organic substances in the chlorinated water, after settling, 78% was sugar, compared with 88% in the limed water, in which the non-sugars were more completely eliminated by the lime. The proportion of the sugar content inverted at factory A was 6·35%, compared with 34·18% at factory B. While the BOD_5 of the pond water at A was 3350 mg/litre, that at B was 3420 mg/litre. While the chlorine treatment retards liberation, it is insufficient to reduce bacteria and moulds, and is superior to lime only by virtue of its comparatively low costs, while the lime treatment is technically superior.

* * *

The microbiology of the Swedish granulated sugar production. N. WEMAN. *Socker Handl.* II, 1959, **15**, 35–40.—The examination methods for bacterial infection in granulated sugar from Swedish sugar factories are based on those of the U.S. National Canners' Association and are described. Results of factory analyses are tabulated. It was found that there is a higher mesophilic and a lower thermophilic infection in the bottom of a centrifugal basket than in the upper half, while there is no increase in infection during drying, owing to the high temperature. Moist sugar on steel conveyors and elevators becomes more infected, mostly with mesophilic aerobic bacteria, as does sugar, generally consisting of yellow sugar lumps, left on the vibratory screens before the silos. Fine sieving, with openings of 0·85 × 3·0 mm, removes a large number of bacteria with the lumps. At only one factory did the analysis figures during January–September 1958 exceed the standards, and this was due to an exceptionally high figure for mesophiles in the February.

* * *

Purification of sugar factory waste waters. D. KRAMER. *Zucker*, 1960, **13**, 39–47.—A review is presented, with 49 references to the literature, of the developments in waste water purification processes, although soil filtration is not touched on, being separately treated in a future paper. The processes mentioned are used for press, diffusion, wash, flume and condenser waters. Generally artificial biological processes are not suitable, whereas satisfactory purification can be achieved by storage under suitable conditions (return of waste water and sufficient storage space). This technique has the special advantage in that the water can be disposed of for agricultural purposes in the summer.

* * *

Unloading and storage of sugar beet. H. MATHEIS and P. BERGER. *Zeitsch. Zuckerind.*, 1960, **85**, 12–20.—The numerous methods of beet unloading and beet piling in Germany are reviewed, with their advantages and disadvantages, and the ventilation of stored beet is discussed. The article is profusely illustrated.

* * *

Pressed pulp yield % beet with complete (waste water) return. W. DÖRFELDT. *Zeitsch. Zuckerind.*, 1960, **85**, 25–26.—For calculation of the sugar losses % beet in diffusion when 100% waste water is returned, the pressed pulp yield % beet must be known, especially where continuous diffusers are used. The formulae and values quoted by some authorities are given and a table presented of pressed pulp yields for pol of 0·3–1·5%, dry substance of 14–22% and beet marc content between 4 and 5·5%. The values were obtained by graphic interpolation of the relation between sugar and non-sugars of the press water according to MÜCK[2]. It is emphasized that the analytical data

[1] *See Zucker*, 1956, **9**, 8–13.
[2] *Deut. Zuckerind.*, 1940, **65**, 458; Zuckertechniker-Taschenbuch. 1956, pp. 66–68.

of MÜCK were based on one factory only, with battery diffusers, and that the pressed pulp yields could be lower in a factory using continuous diffusers and separating the fresh and return water, and where extraction would possibly be higher. Some values are given as a guide where certain of the factors in question are variable.

* * *

Oil firing in the sugar industry. W. TEUBER. *Zeitsch. Zuckerind.*, 1960, **85**, 27–29.—The advantages to be gained from introducing oil burning in a sugar factory are enumerated with illustrations and diagrams of pressure atomizers, pumps, boilers and an oil-fired drum dryer.

* * *

Softening of thin juice by means of cation exchangers. I. Mechanism of ion exchange in softening and regeration. The effect of softening on thin juice quality. F. DURDÍK and J. BURIÁNEK. *Listy Cukr.*, 1960, **76**, 2–7.—The theory of deliming thin juice by passing it through a cation exchange resin, the K^+ and Ca^{++} ions being replaced by Na^+ ions, is discussed and graphs are presented showing the variation of Na^+, K^+ and Ca^{++} concentrations with the volume of juice treated, using columns contining "Lewatit S-100" and "FNA" resins. Also shown graphically is the extent to which K^+ and Ca^{++} ions are adsorbed (in meq/litre) as dependent on the amount of juice treated. (After displacement of all the Na^+ ions on the resins, the K^+ ions are displaced by the Ca^{++} ions.) Pilot-plant and factory tests have shown that the treatment has practically no effect on the thin juice quality, the amount of adsorbed colouring and nitrogenous substances being small. Nor is any effect on juice alkalinity and invert sugar content confirmed. There is only a slight increase in purity. In the main the only changes are those brought about in the cation composition. No effect on the sugar content of final molasses was detected.

* * *

The present situation regarding purification of sugar factory waters. J. BULÍČEK. *Listy Cukr.*, 1960, **76**, 7–10.—Bacterial infection from waste waters and waste water treatment and disposal are discussed. Recirculation of diffusion and press waters could reduce the bacterial population from an equivalent of 7 million to 4 million and even 3½ million. This would also help to reduce the annual water consumption from 70 million cu.m. to 4–7 million cu.m., as has been achieved in East German factories, and would reduce the dangers of infection.

* * *

The effect of invert sugar on the settling and filtration rates of 1st carbonatation juice. R. OSVALD. *Listy Cukr.*, 1960, **76**, 10–13.—In laboratory tests diffusion juice was treated with milk-of-lime (1·5% CaO on juice) in one stage or progressively (0·25% CaO on juice + 1·25%) and gassed to 0·080% CaO alkalinity with CO_2 before filtering, when the filtration coefficient (F_k), settling properties and rate were determined. Doses of up to 2·00% invert sugar on juice were added to raw juice samples before carbonatation. Tabulated data and graphs show that with single-stage liming 0·25% on juice of invert sugar causes a 30% increase in the value of F_k, 0·50% causes a 70% increase, and 1·0% a 100% increase. A 50% drop in the settling rate occurred when 0·50% invert was added and the volume of the sediment increased by about 20%. With progressive liming the same effects were observed, although on a very slightly reduced scale, a 0·50% invert sugar dose increasing the value of F_k by 50%, reducing the settling rate by 50% and increasing the sediment volume by 15%.

* * *

Boiling out evaporators with "Complexon" and regeneration of the spent "Complexon". K. ČÍHAL. *Listy Cukr.*, 1960, **76**, 16–18.—The use of EDTA as a 5% aqueous solution to boil-out evaporators is discussed with 13 references to the literature. While costs are twice as high as mechanical scale removal, these could be cut by regenerating the EDTA or by combining EDTA treatment with mechanical cleaning.

* * *

Processing beet tails. K. RAIS, O. BÖHM and O. LISÝ. *Listy Cukr.*, 1960, **76**, 13–16.—The problems of beet tail processing are discussed and some details ard given of the plant in Čakovice factory. The economics of beet tail processing are discussed, and it is calculated that working of 1% tails on beet with an assumed white sugar yield of 5% would be an economic proposition.

* * *

Sugar manufacture in the D.D.R. L. SZERECZ and P. WERTAN. *Cukoripar*, 1959, **12**, 110–114, 143–146, 173–175, 202–204, 247–252; through *S.I.A.*, 1959, **21**, Abs. 866.—A detailed illustrated survey is given of plants and processes in use in East German sugar factories.

* * *

D.d.S. diffusion. I. TÓTH-ZSIGA. *Cukoripar*, 1959, **12**, 214–217; through *S.I.A.*, 1959, **21**, Abs. 872.—A description of the Danish diffuser and a survey of its advantages are given.

* * *

Recirculation of muddy juice in the Russian continuous counter-current saturator. K. JÁNOSFY. *Cukoripar*, 1959, **12**, 178–179; through *S.I.A.*, 1959, **21**, Abs. 878.—A Russian continuous saturator is in use at Acs sugar factory. In a three-day test, a pump was fitted for recirculation of up to 350% of juice in the saturator, in a manner similar to that of the Lange patent[1]. The rate of sedimentation improved by 11% and the mud volume was reduced by 23%.

* * *

Briquetting of dried beet cossettes. K. GADÓ. *Cukoripar*, 1959, **12**, 159–161, 180–182; through *S.I.A.*, 1959, **21**, Abs. 912.—Beet pulp, to which molasses may be added, is briquetted at Ercsí factory

[1] German Patent 937,880.

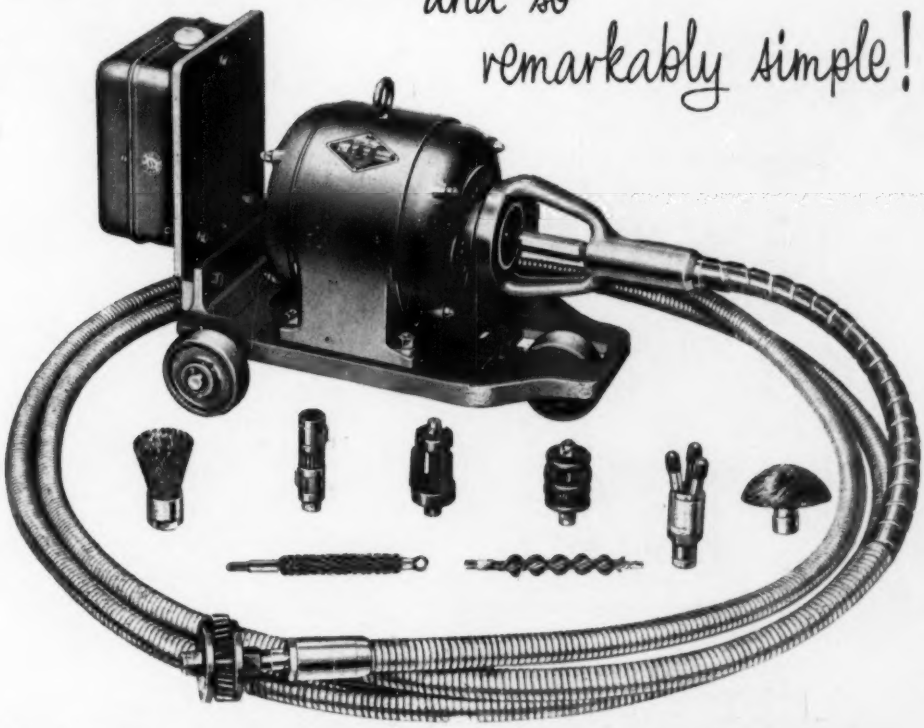
SKATOSKALO

TUBE & SURFACE SCALING EQUIPMENT

POWERFUL PENETRATING POSITIVE

and so remarkably simple!

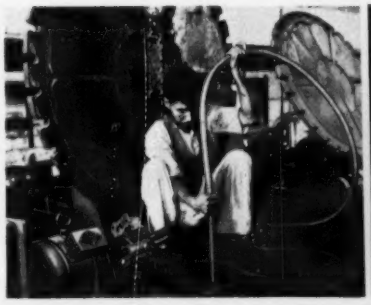
Electric, Petrol or Air driven.



Our unrivalled experience of scaling methods—and problems—has enabled us to develop a range of scaling machines, tools and accessories without equal.

However obstinate and tenacious the deposits become, "Skatoskalo" toolheads and brushes will remove them entirely, leaving clean burnished surfaces which delay the formation of fresh deposits.

Use "Skatoskalo" equipment regularly to restore boilers, economisers, evaporators, juice heaters, condensers and triple effets to full thermal efficiency.



CARLTON HOUSE
HIGH STREET

Flexible Drives (Gilmans) LTD.

SMETHWICK
STAFFS, ENGLAND

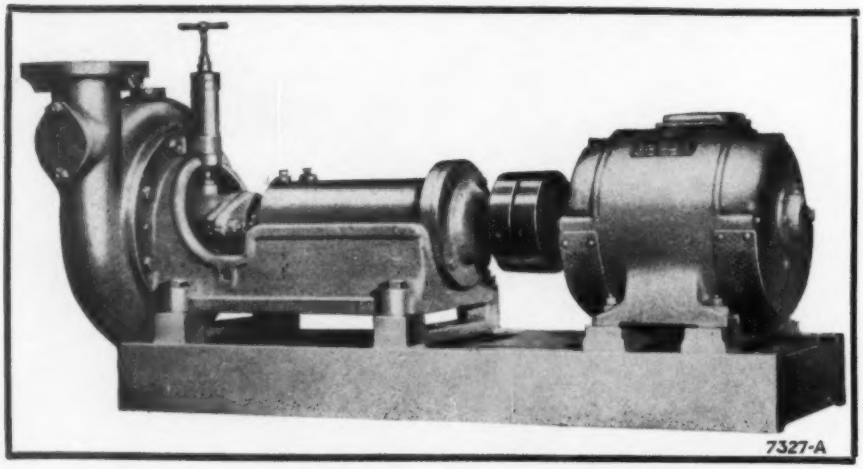
Cables: Skatoskalo Birmingham

Code: Bentleys

AGENTS IN ALL CANE & BEET SUGAR PRODUCING AND REFINING AREAS.

Streamline

MILL IMBIBITION PROCESS



MIRRLEES CHOKELESS PUMPS

Recent installations:

VENEZUELA—
El Palmar and Rio Turbio;

PUERTO RICO—
Central Guanica;

CUBA—
Palma; Ermita, Providencia;

BRITISH WEST INDIES—
Basse Terre, Antigua, Corozal, Richmond, Rosehall, Hampden;

DOMINICAN REPUBLIC—
Boya, La Romana.

Install Mirrlees Unstrained Return Juice Pumps in conjunction with scraper, rotary or vibrating screens.

★

Full information on request:

The MIRRLEES WATSON COMPANY LIMITED

Head Office and Works: SCOTLAND STREET, GLASGOW, C5.
London Office: 38 Grosvenor Gardens, S.W.1.

by means of an 85 h.p. Kahl press to form 18 × 22 mm blocks, of density 2 to 3 times that of loose pulp, at a rate of 4 tons/hr. The cossettes should have 13–14% moisture before pressing. The plant is described and illustrated.

* * *

The betaine plant of the Ercsi sugar factory. K. HANGYÁL and I. RADICS. *Cukoripar*, 1959, **12**, 209–213; through *S.I.A.*, 1959, **21**, Abs. 913.—Molasses is diluted to 40°Brix and treated with a cation exchanger. The filtrate (20–22°Brix) is limed and evaporated to 80°Bx. The exchanger, after washing, is eluted with dilute NH_4OH and the eluate is evaporated to 40°Brix. The betaine content is 30–32%; other substances present are amino-acids. The ammonia is recovered and the exchanger is regenerated with HCl.

* * *

Microbiological studies in the sugar industry. O. VAJDA. *Cukoripar*, 1959, **12**, 166–168A, 185–189, 220–226; through *S.I.A.*, 1959, **12**, Abs. 922.—A review is given of sources of infection, the microbiology of bacteria likely to be present, testing methods and means of sterilization. Continuous disinfection with 9% of NaOCl was found to be better than occasional treatment of a diffusion battery at Hatvan. Graphs are given of live thermophile and mesophile counts, and pH, in the different cells of the battery, and sugar losses and some other analytical figures are tabulated.

* * *

Corrosion in the sugar industry. I. PAULIK and O. TISZAVÁRY. *Cukoripar*, 1959, **12**, 182–184; through *S.I.A.*, 1959, **21**, Abs. 969.—A review is given of the causes and effects of corrosion.

* * *

Effect of the reaction (pH) of water used for diffusion on the performance of the juice purification station. A. K. KARTASHOV, YU. D. GOLOVNYAK, R. G. ZHIZHINA and N. A. MAKSIMOVA. *Sakhar. Prom.*, 1960, (1), 9–10.—Laboratory tests were carried out on mains water used for diffusion to gauge the effect of its pH on the invert sugar colloid and pectins of raw juice[1], 1st carbonatation juice filtration rate and settling rates and properties. The neutral water was acidified with SO_2 or made alkaline with ammonia, giving pH values over the range 5–8·6. The juice was purified in the laboratory with 100% return of carbonatation juice to pre-liming. Normal battery conditions were used: maximum temperature of 80°C, water temperature of 45°C and a 60-min cycle, while in one series of tests the conditions corresponded to those in a continuous diffuser, viz. maximum temperature of 80°C, tail temperature 65–70°C and a 100-min cycle. Tabulated data show that the optimal pH is 6·0, at which the filtration and settling rates were higher than at pH 5·0, 7·1 and 8·6. The pectins content at pH 5·0 was 20–30% lower than at pH 6·0, but 20–70% higher at pH 8·6. The colloid content also increased with pH. The pH had no effect on settling rate and properties or colour of the 1st carbonatation juice. The invert content of the raw juice increased by 10% with a drop from pH 7·1 to pH 5. The effect of the pH of the water was the same for different qualities of beet (fresh, stored and very stale).

* * *

Reasons for obtaining pulp, fines and irregular beet cossettes. P. S. SICHEVOI. *Sakhar. Prom.*, 1960, (1), 11–14.—Tests using beet knives of the author's own design[2] have shown that irregularity in cossette thickness (e.g. from 0·85 to 1·4 mm for a 22 m/100 g slice) is caused by inadequate pressure between beet and knives, the fluctuations in thickness being greater with disc-type knives than with centrifugal knives. However, increase in the pressure will only achieve the desired effect provided that there are no defects in the construction of a centrifugal knife frame and that the centrifugal force is sufficient; otherwise pulping will occur. Under ideal conditions, beets sliced in a centrifugal frame had a permeability of 71·5 cu.m./sec raw juice, as opposed to 11·4 cu.m./sec for cossettes cut with disc knives. Irregular feeding of the beets into a centrifugal frame and blocking will cause a drop in the centrifugal force. Feeding by screw from a hopper is advocated to overcome this defect, as well as the use of slanting knife blades. Blockages are also caused by excessive friction between the beets and knives, especially when damaged or dirty beet are sliced. Slicing speeds of 11–16 m/sec are recommended.

* * *

Method of studying the kinetics of diffusion of sugar from beet cossettes. V. M. VOLOKHVYANSKII. *Sakhar. Prom.*, 1960, (1), 15–16.—The article by S. F. DRONOV[3] is criticized on the grounds that (1) his results show an increase in the amount of water percolating through the cossette column greater than the increase in flow rate and (2) that his results are not borne out by practice in the U.S.A., where the low diffusion battery losses are due to the use of chains, preventing compacting of the cossettes, and not to increased flow rates. The differences between the concentration of sugar in the cossettes and in the liquor fluctuated widely in the tests, from 17·4–19·2 to 2·0–2·5 units, and at least 2·2–2·6% of the sugar was left in the pulp, an amount almost that at which internal diffusion is less than external diffusion, and at which increases in the flow rate of the diffusion liquor have no effect on the sugar extraction. In some cases 8·1–9·8% sugar was left in the pulp, a consequence, it is asserted, of only 10 minutes' diffusion. A method of studying diffusion is suggested, whereby vessels of different diameters are filled with the same amount of cossettes, so that the height of the cossette columns will be inversely proportional to the area cross-section of the vessel, i.e. of the free space. Thus any liquor percolating through the columns will flow at a rate

[1] *See also I.S.J.*, 1959, **61**, 217.
[2] *See I.S.J.*, 1957, **59**, 188.
[3] *I.S.J.*, 1959, **61**, 341.

inversely porportional to the area cross-section, which should be such as to give a 25% higher flow rate in successive vessels. The amount of sugar left in the pulp should be about 0·2–0·3%. The difficulties of increasing the cossette column length in a continuous tower diffuser are discussed.

* * *

Some features of conveying systems in continuous diffusers. I. I. PRILUTSKII. *Sakhar. Prom.*, 1960, (1), 17.—The effect of the conveyor speed in a diffuser of the Olier or J-type on juice percolation and on the flow rate of the cossettes themselves is discussed. While too low a peripheral cossette speed prevents percolation of the juice, increasing the speed will reduce retention time and increase power requirements. The effective height of the diffuser will also affect percolation, although 10–12 m high diffusers can now be constructed. Increasing the diameter above 4–5 m is inexpedient because of the considerable difference in the displacement rates of the cossette layers over the area cross-section. Results of tests with a Sokolov-type diffuser are used to illustrate these points.

* * *

The accumulation of raffinose in refinery molasses. L. A. VODOLAZSKAYA and M. T. MOLCHADSKII. *Sakhar. Prom.*, 1960, (1), 19–20.—The presence of raffinose in refinery molasses, making accurate determination of the purity and sucrose content difficult, is discussed. Data are tabulated for molasses and syrup for Odessa refinery, including refractometric Brix, pol, sucrose and raffinose percentages. These were obtained by inverting the samples with HCl (1:5) at 67–70°C and calculating by means of a formula. Molasses purities, obtained by direct polarization and inversion are also given for a number of months. Differences between the raffinose content of beet and of final molasses may be due not only to decomposition but also to crystallization of some of the raffinose together with sucrose, which would also explain abnormal increases in granulated sugar pol.

* * *

Experience in the use of barometric condensers. V. M. PERTSEL' and V. N. GOROKH. *Sakhar. Prom.*, 1960, (1), 22–28.—The modified condensate removal scheme at No. 2 Petrovsk refinery is described with a flow diagram. Four TSINS (Central Sugar Research Institute) barometric condensers were installed, three for evaporator effects, and one for the vacuum pans. Tests were carried out, in which the pressure drop in the system of a given condenser was determined, as well as the apparent vapour-condensate density in the riser, the loading in fresh condensate on the condenser, and the temperature at which flash-evaporation took place. Full details are given with diagrams of the condensers and graphs of the various parameters. The condensers operated satisfactorily without knocking and ensured regular condensate removal. The steam valves were dependable and flash-evaporation of the condensate was complete. At the refinery 18 automatic steam traps were dismantled and the length of the condensate lines was considerably reduced.

* * *

Removal of filter cake from rotary vacuum filters with a steam-air blow-through. A. M. SOLODKOVSKII. *Sakhar. Prom.*, 1960, (1), 28.—A mixture of excess vapour from the 2nd evaporator effect with compressed air has been used at Karabaltinsk factory to remove the filter-cake from the B-40 rotary vacuum filters, with the result that only 3 filters at below maximum loading are now required instead of 4 as formerly. This is attributed to a 30% increase in the capacity of the filters as a result of the blow-through. The life of the filter-cloths has been doubled and steam requirements are much lower than with the use of exhaust steam from a turbine.

* * *

Automation and the sugar factory. G. PIERONI. *Ind. Sacc. Ital.*, 1959, **52**, 461–469.—Applications of automatic control which have been developed recently are described and the need for adequate training of operators is emphasized.

* * *

Market losses (of pol in beet). A. PASETTI. *Ind. Sacc. Ital.*, 1959, **52**, 485–492.—Losses in polarization between the reception and weighing station and processing are attributed to four causes: the system of analysis; storage in silos; transport in flumes; and washing of the beets. The literature on each is reviewed and the effect of other factors—climate, discharge system, and condition of the beets—is examined.

* * *

Comparison of filtration, static decantation and centrifuging. I. A. PARATELLO. *Ind. Sacc. Ital.*, 1959, **52**, 493–499.—Static and centrifugal decantation are considered and compared theoretically on the basis of Block's formula[1].

* * *

Thermocompression of steam at Zduny sugar factory. A. SWEDROWSKI and J. JAKUBOWSKI. *Gaz. Cukr.*, 1960, **62**, 4–9.—A description is given of 3 French thermocompressors (Maison Breguet) installed in Zduny factory in 1958, with semi-automatic controls (Soc. Française des Reg. Universels Arca) and the fundamentals of thermo- and turbo-compression are discussed. It was found that the steam consumption was 3·7% lower on beet over 2 months than during the previous campaign, while syrup density was high at about 65°Bx with a thin juice Brix of about 15·7°. Average daily throughput was higher for October-December at 1450 tons as opposed to 1325 tons in 1957. Average fuel consumption for the boilers was 8·04% compared with 9·06%. An improvement on these figures is expected in the next campaign as it is considered that the efficiency of the thermocompressors should be higher.

[1] *Clarification et separation des liquides.* (Dunod, Paris.) 1931, p. 20.

RUTHS STEAM ACCUMULATOR
FOR FLACQ UNITED ESTATES SUGAR FACTORY, MAURITIUS
MADE BY COCHRAN & Co. ANNAN Ltd. SCOTLAND
CAMIONAGE MAXIME CAYEUX

One of the two Ruths Accumulators supplied to Mauritius

This steam user proved that

STEAM STORAGE

increased factory efficiency and production

As part of an expansion scheme Flacq United Estates Sugar Factory of Mauritius installed two Ruths Accumulators with the result that the existing boiler plant became capable of supplying steam at a steady pressure to the greatly increased process consumers. In addition the increased production is going on with improved efficiency.

The customer states ". . . it is beyond any doubt that the two accumulators . . . have to a very considerable extent helped in attaining this remarkable achievement".

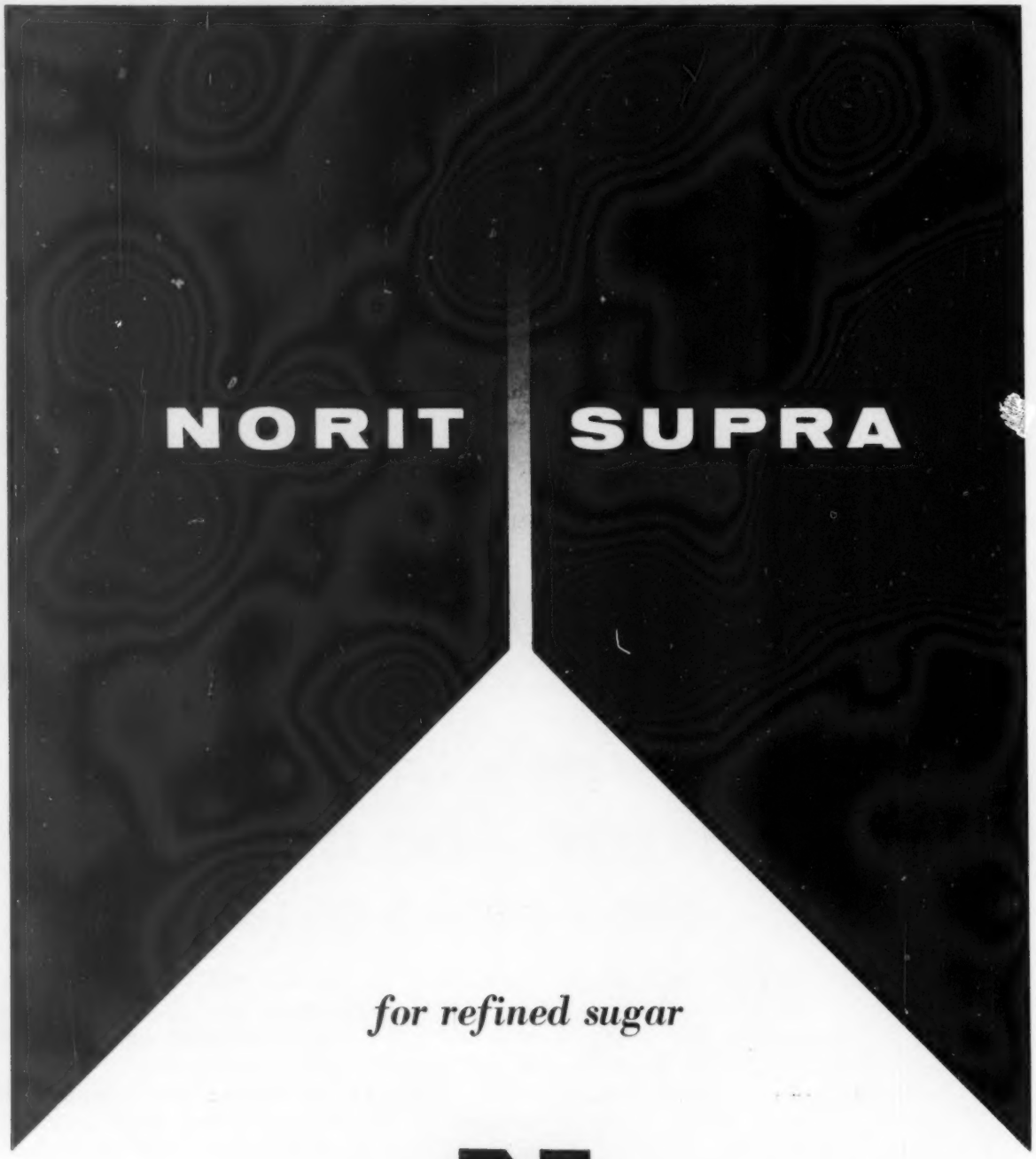
Cochran, the makers of Ruths Steam accumulators, are glad to supply schemes to solve factory steam problems, and invite you to avail yourself of their experienced technical service.

RUTHS
Regd. Trade Mark

STEAM ACCUMULATORS

COCHRAN & COMPANY, ANNAN, LIMITED, 34 Victoria Street, London, S.W.1. Abbey 4441 and at ANNAN, DUMFRIESSHIRE, SCOTLAND. Annan 111

TAS/CH 680



UNITED NORIT SALES CORPORATION LTD - AMSTERDAM - HOLLAND

New Books and Bulletins

Sugar Plant Guide Book. TAKEO YAMANE. 24 pp; 8¼ × 11½ in. (Japan Consulting Institute, Nikkatsu International Building, 1–1 Yuraku-cho, Chiyoda-ku, Tokyo, Japan.) 1959.

The Japan Consulting Institute, which has offices in Bangkok, New Delhi, Karachi, Cairo, Mexico, Rio de Janeiro and Buenos Aires, is an organisation which provides consultant services in drawing up project reports for construction and expansion, designs plant, prepares specifications and tender forms, recommends contractors, guides and supervises plant construction and provides operational and technical guidance of the plants. It draws on the experience of a number of sugar machinery manufacturing companies and has commissioned Dr. YAMANE, Director of the Technical Dept. and Research Laboratory of the Japan Sugar Refineries' Association, to compile this booklet to supply fundamental and technical information on sugar manufacture from cane and beet and the refining of raw sugar.

The cane sugar manufacturing process, various methods of refining and beet sugar processing are described with the aid of many illustrations, flow diagrams, etc., with appropriate reference to Japanese installations and techniques. In addition plant layouts are given for double-sulphitation and double-carbonatation factories processing 1000 tons of cane per day. The book is very well printed, with some very attractive colour photographs. There are a few spelling mistakes, understandable in a booklet published in a foreign language, but a more unfortunate feature is the number of incorrect pages given in the contents list.

* * *

Lamborn's Compendium of World Sugar Statistical Data. Part I. iv + 37pp; 8½ × 12 in. (Lamborn & Co., 99 Wall Street, New York 5, N.Y. U.S.A.) 1959.

This mimeographed compilation gives the details which are available of sugar imports and their sources for 82 countries in the years 1957 and 1958. Similar data are provided for 72 exporting countries giving destinations and tonnages. The data, in thousands of metric tons, raw value, are recorded by geographical regions, but an index lists the individual countries in alphabetical order. The third section comprises a series of tables of the world free market quotas under the International Sugar Agreement, together with changes resulting from deficit reallocations, etc., for the years 1954 to 1958. The assembly of data is very easy to use and will undoubtedly be a valuable addition to any library of sugar statistics.

Pest Infestation Research. Dept. Sci. Ind. Research. 55 pp; 6 × 9½ in. (H.M. Stationery Office, London, E.C.1.) 1958. Price: 5s. 0d.

The report deals mainly with the control of pests in stored perishable produce and houses, but it contains accounts of very interesting investigations covering the problem of the development of resistance. The studies are in their infancy but already, through the use of the modern techniques of tagged elements, chromatography and so on, it has been demonstrated that resistance is, in some cases at least, closely associated with the physiological or biochemical reactions of the insect.

* * *

The Gilmore Louisiana–Florida Sugar Manual 1959. Ed. F. I. MEYERS. 208 pp.; 7¾ × 10½ in. (Gilmore Publishing Co. Inc., 525 Audubon Buildings, New Orleans 16, La., U.S.A.) 1959. Price: $10·00.

The latest in the Gilmore series, covering the U.S. Mainland cane area, follows the same pattern as previous editions, giving up-to-date information on the sugar industry organizations, factories, refineries and personnel, as well as cane and sugar crop data for 1957/58 and 1958/59, and figures for past seasons. The book is complete with maps of the Louisiana and Florida sugar areas, a Buyers' Guide, and an index to advertisers. The Editor writes that orders for the manual are increasing from all over the world; this is not surprising since its complete and detailed account of the U.S. Mainland cane area will be invaluable to all concerned with that industry.

* * *

Sugarcane and its Diseases. C. W. EDGERTON. 254 pp; 6 × 9 in. (Louisiana State University Press, Baton Rouge, La., U.S.A.) 1959. Price: $7.50.

The first edition, of which the present volume forms the second and revised edition, was published in 1955[1]. The new edition follows the same lines as the previous, being divided into two parts. The first covers the history, structure, classification, breeding and varieties of sugar cane; the second and larger part deals with the diseases *seriatim*, fungoid, bacterial, virus and malformations. The revision is well shown in the discussion of root stunting disease, extended from 3 to 7 pages with a discussion on the probability of its being the cause of varietal "running out." The format, type and quality of paper are much improved, giving clarity to the numerous illustrations. The book, with its extensive bibliography, forms a valuable work of reference.

[1] *I.S.J.*, 1956, **58**, 20.

Rapid factory analysis for determination of invert sugar, lactic acid and amino acids in sugar factory products. V. PREY, O. SZABOLCS and I. SZABOLCS. *Zeitsch. Zuckerind.*, 1959, **84**, 614–617.—A colorimetric method of determining invert sugar, lactic acid and amino acids, all within 30 minutes, is described. The invert sugar is determined according to a previously described method[1] as is the lactic acid.[2] The amino acids content of the juice is determined against the "blue number," using the normal "blue number" reagent of 10 g $Cu(NO_3)_2$ and 250 g of sodium acetate in 1 litre of water. The juice is run through a mixed bed ion exchange column, containing 10 ml freshly regenerated strongly acid "Amberlite IR 120" cation exchanger and 10 ml weakly basic "Amberlite IR 4 b" anion exchanger. Thin juice (50 g), thick juice (10 g) or molasses (2 g) (the latter diluted) is added and sweetened-off with 200 ml conductivity water. The column is then eluted with 2N NH_4OH until a 50 ml measuring column placed beneath the ion exchanger is filled. From the eluate the lactic acid is directly determined colorimetrically, and an aliquot evaporated on a water bath for determination of the amino acids. During the ½-hr reaction time of the lactic acid the invert sugar can be determined, after which the lactic acid and the amino acids are determined colorimetrically.

* * *

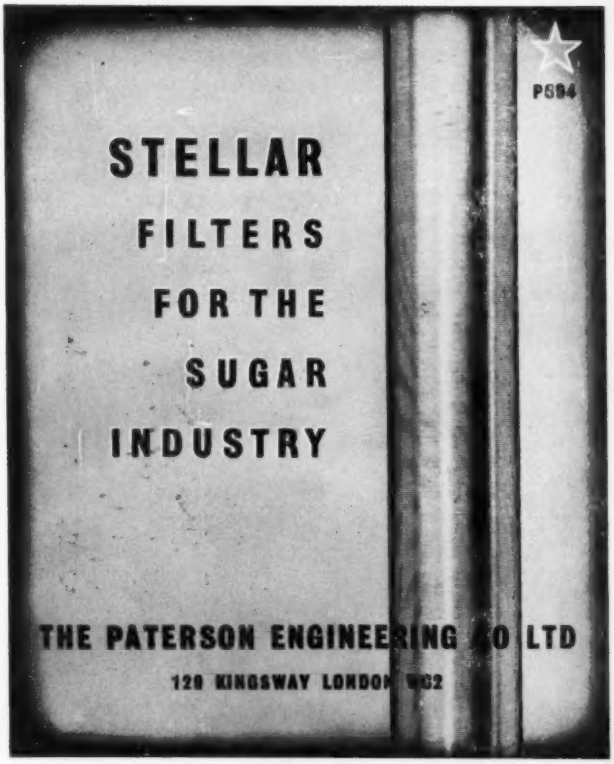
The development of polarimetric sugar determination. E. EINSPORN. *Zeitsch. Zuckerind.*, 1959, **84**, 617–625.—A review is given, with 14 references to the literature, of the developments in polarimetric determination of sugar, with particular regard to the fixing of the 100°S point on the sugar scale and to the importance of the quartz control plates. Temperature correction tables are given for temperatures above and below 20°C and a guide is given to the use of these tables. Graphs and data are also presented comparing the rotation of two quartz plates from experimental data of E. GUHMLICH and L. EYNON and collaborators.

* * *

Radiolysis of sucrose. S. V. STARODUBTSEV, SH. A. ABLYAEV and V. V. GENERALOVA. *Izvest. Akad. Nauk Uzbek S.S.R., Seriya Fiziko-Tekhnicheskii*, 1959, (1), 75–80.—It was found that a decrease in the angle of rotation occurred on irradiation of sucrose solutions with γ-radiation from radio-cobalt (^{60}Co), the change being greater, the lower the concentration of the solution. This is explained by the fact that the water undergoes radiolysis under the influence of the γ-rays, so that H and OH radicals are formed. Oxidation-reduction processes occur, and part of the molecules of sucrose and of its hydrolysis products are oxidized by the free radicals. Thus the sucrose concentration falls and the angular rotation is reduced. The change in the specific rotation of the solutions, prepared with irradiated dry sucrose, was 7–10 times less than that of the irradiated solutions and the change in the angular rotation became noticeable only at doses greater than 100 million Roentgens. Irradiated and non-irradiated dry sucrose was stood in a desiccator for 24 hr, then made up into solutions of identical concentrations under identical conditions. The rate of dissolving was 2–3 times greater than with the irradiated sucrose, the difference being particularly noticeable at high concentrations. This change in the rate of dissolving is attributed to the formation on irradiation of large numbers of gas bubbles inside and on the surface of individual sucrose crystals. On dissolving of the sucrose, these bubbles are violently separated, breaking up the crystal faces and increasing the contact surface between sucrose and solvent. Chromatographic analysis of the irradiated and control sucrose (dry and in solution) showed that glucose and fructose are formed in small and almost equal amounts on irradiation of sucrose solutions, while there is no change to the sucrose in the control. Apart from sucrose, only fructose was found in solutions of sucrose irradiated while dry. Mixtures of various organic acids were found in solutions subjected to very large doses. Observations made during 25 days on two solutions of 30 and 10% concentration after irradiation with up to 100 million Roentgens, showed that the rate of change of the angular rotation was much lower without irradiation than with irradiation. The slope of the curves for the two solutions on a graph of angular rotation change *vs.* number of days after irradiation is almost identical. The changes, not being so dependent on the concentration, as shown by the curves, may be caused by mutarotation of the sucrose destruction products and by the secondary action of the molecular products of radiolysed water, e.g. H_2O_2 and various acids. Irradiation of sucrose in solution and dry form causes the solution to become yellowish and the dry sucrose to take on a brownish tint. It was found that irradiation caused greater changes at higher temperatures, the change in angular rotation of a 44% solution at 22°C irradiated with 11 million Roentgens being 0·55° compared with 1·42° at 65°C.

[1] *I.S.J.*, 1959, **61**, 377.
[2] *I.S.J.*, 1960, **62**, 142.

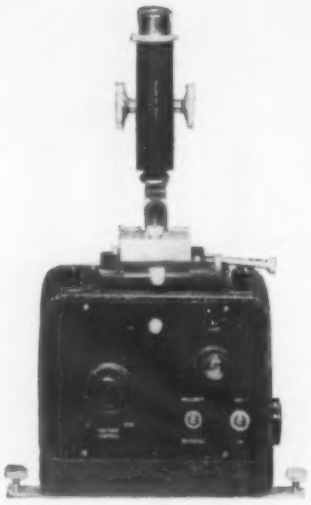
YOU MUST SEE THIS



It's the *new* booklet about a new filtration technique . . . STELLAR. In its pages are described and pictured the functions of Stellar Filters in the clarification and polishing of sugar syrups. You'll find it well worth reading. May we send you a free copy?

Write: Stellar Department
Paterson Engineering Co. Ltd.
129, Kingsway, London, W.C.2

A Suma Product



COLLIMETER (Cataphoresis Cell)

COLLOIDS in juices retard boiling, increase viscosity, hamper efficient work in the centrifugals, and generally reduce the capacity of your factory.

COLLOIDS should be removed during the clarification stage. How efficiently does this happen with one particular clarification process in comparison with another ?

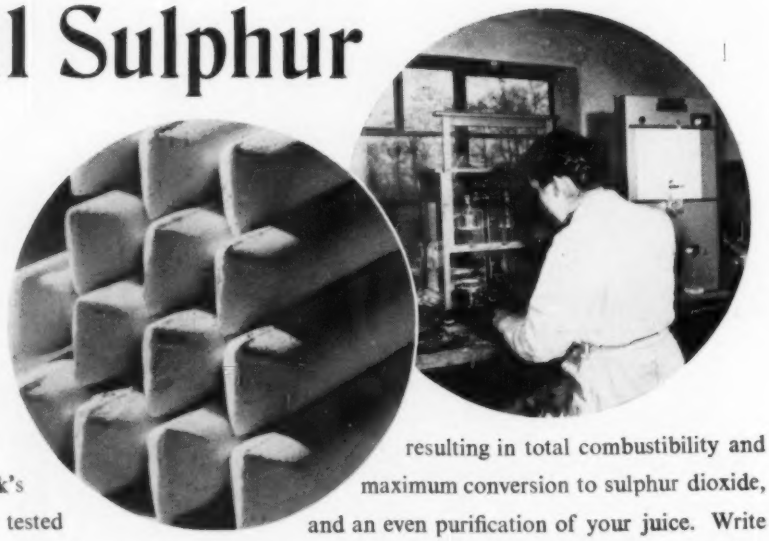
The **COLLIMETER** is the first instrument which can provide a simple and rapid answer to that question. Comparisons are made on the basis of the quantity of a standard dyestuff required to bring a sample in a cataphoresis cell to the iso-electric point.

Full details are given on page 1 of the Suma Catalogue, sent free on request.

The Sugar Manufacturers' Supply Co. Ltd.
7 & 8, IDOL LANE, LONDON, E.C.3, ENGLAND.
Cables : "Sumasuco, London."

Berk's Roll Sulphur

TESTED FOR UNIFORMITY



The mark that guarantees the product all over the world.

You buy quality when you buy Berk's Roll Sulphur—at a quantity price. Berk's bright yellow Roll Sulphur is regularly tested in modern laboratories and the absolute minimum of impurity is present. The ash content is non-existent, resulting in total combustibility and maximum conversion to sulphur dioxide, and an even purification of your juice. Write to us now and we will reply by return giving you shipping details and prices. It pays to buy your sulphur from Berk!

Overseas enquiries to

F. W. BERK & CO. Ltd. Dept. HCS/SJ, **STRATFORD, LONDON, E.15**
Cables: Berk London Telex 23796

The polarization of normal sugar solutions at temperatures about 20°C[1]. E. EINSPORN. *Zuckererzeugung*, 1959, **3**, 322–323.—Polarimetric determination of samples above or below 20°C should give results to within 0·01°S. Guides to this are given, with sample calculations.

* * *

Variation in colour value of Taiwan plantation sugars. W. CHEN and Z. H. SHU. *Rpt. Taiwan Sug. Expt. Sta.*, 1959, (19), 67–72.—The colour index, i.e.

$$\frac{1000\,(\log T_{420} - 2\log T_{720})}{bc}$$ where b = cell thickness (cm), c = concentration (g/ml) and T = transmittancy, was found to be generally high during the beginning of the 1957/58 campaign for the 15 factories producing SWC white sugar. The colour indices fell as the season progressed, rising again at the end when the cane crushed was of lower quality. Four factories produced sugar with a colour index equivalent to high quality refined sugar (C.I. = 14·8–27·81), while sugar from seven factories was comparable to normal quality refined sugar (32·53–34·64). The remaining four produced sugar of 39·03–52·05 colour index. By improved control of liming and carbonatation, and use of good quality cane, it is possible to obtain sugar of low colour index and low CaO content. The latter is considered to be an indication of clarification efficiency; no connexion was apparent between ash content and colour value of the sugars.

* * *

Ion exchangers in sugar analysis. I. Determinination of inorganic salts concentration. J. BURIÁNEK and D. ŠLECHTOVÁ. *Listy Cukr.*, 1959, **75**, 269–272.—The inorganic salts concentration in a solution made up of 20 g thin juice, 5 g thick juice, 2 g syrup or 1 g molasses, each dissolved in 100-150 ml water, was determined by passing the solution at 1 ml/min through a 10-ml column of "Amberlite IRA 400" strongly basic anion exchange resin in OH^- form. The inorganic cations are converted to strong hydroxides, which are easily determined by titrating with phenolphthalein indicator. Weak hydroxides are formed from the organic cations but do not disturb the determination. The column was washed with 0·1 N HCl and then with water until the washings were neutral to phenolphthalein. The eluate and washings were then titrated with 0·1 N NaOH to phenolphthalein end-point. The re-titration eliminates error due to absorbed CO_2 in the alkaline solution and permits determination of the Mg^{++}, which forms very slightly insoluble hydroxide. As control, 5 g of thick juice (±10 mg) or 2 g of molasses were burned to sulphate ash, which was then dissolved in 100 ml ammonium acetate (pH 4·5–5·0). EDTA was added in excess to prevent formation of very slightly soluble $CaSO_4$, and the solution filtered. The SO_4^{--} content was then determined as $BaSO_4$. The results of determinations of 5 different samples of thick juice and of molasses are tabulated, with the concentrations given as meq/100 g (titration) and as g $BaSO_4$/100 g (gravimetric). The ratio of the former to the latter is also given, the average of 8·559 (8·01–8·91) closely agreeing with the theoretical value of 8·568. The reproducibility of this method of titration is the same as with other titration methods, but there is no effect of sugar destruction or non-sugars on the results, nor is the pH taken into account. It does not have the disadvantages of the method using cation exchange resin on the H^+ cycle.

* * *

The alkaline degradation of glucose in the presence of sodium sulphite. J. DUBOURG and A. LEMAITRE. *Sucr. Franç.*, 1960, **101**, 3–8.—The degradation of glucose in an alkaline medium at 20°C with and without sulphite was studied by examining the changes in absorption curves at intervals. Respective concentrations in the solution were 1% sucrose, N NaOH and N/10 Na_2SO_3. In a solution without sulphite there were initially two absorption bands at 260 mμ and 275mμ. After 2 hr there was an appreciable increase in absorption in the u.-v. region and towards the visible spectrum, two bands being noted, one at about 270 mμ (between the first two curves), and the other at about 315 mμ, characteristic of the enol group. Examination of similar samples after acidification to pH 1 showed that the 315 mμ band did not appear while a new band developed at 265 mμ after 24 hours. After 500 hr the enol band in alkaline medium disappeared while one at 265 mμ became distinct. The band at 265 mμ, observed above on acidification, disappeared. In the presence of N/10 sodium sulphite, the band at 315 mμ disappeared after 500 hr, while the 265 mμ band after long contact became less intense than in the absence of the Na_2SO_3. Acidification caused the 315 mμ band to disappear and gave rise to a distinct band at 305–310 mμ, which was displaced later towards the visible spectrum, reaching limited stability at 280–285 mμ. This latter corresponds to hydroxymethylfurfural. The sulphite concentration used was not sufficient to inhibit completely the degradation of the glucose, which ended with colour formation. This band appears whether the sulphite is added before or during decomposition of the glucose, providing in the second case the glucose has not completely disappeared. If the sulphite is added after the enol band has disappeared (e.g. after 500 hr) the solution is decolorized in visible spectrum, but after acidification the 310–280 mμ band no longer exists. Thus it seems that a part of the glucose does not appear in the absorption band in the alkaline medium, but is converted under the action of the sulphite to a substance disclosed only by acidifying, when it changes at low pH values into a substance, characterized by the 280–285 mμ band, which could be hydroxymethylfurfural.

[1] *See also I.S.J.*, 1960, **62**, 170.

BY-PRODUCTS

Development of basic organic chemicals in India. IV. Products from sucrose. R. T. THAMPY and N. R. KULOOR. *Chem. Age India*, 1959, **10**, (1), 37–52; through *S.I.A.*, 1959, **21**, Abs. 906.—A comprehensive review (85 references) is given of plastics and poylmers directly obtained from sucrose (sucrose phenol formaldehyde resins, allyl sucrose, sucrose octa-acetate), plastics and polymers from sucrose via lactic acid (acrylic polymers, synthetic rubbers from acrylonitrile, lactoprene), detergents, plasticisers, chemical intermediates (lactic acid, citric acid, aconitic acid, mannitol, sorbitol, levulinic acid, 2,3-butylene glycol, itaconic acid), dextran, and miscellaneous products such as herbicides and sequestering agents. The economics of allyl sucrose and detergent manufacture in India are presented.

* * *

Fodder yeast from waste molasses. J. P. SHUKLA and B. D. KAPOOR. *Sharkara*, 1959, **2**, 130–135.—Sulphitation and carbonatation factory molasses is not suitable for ammoniation which would increase its value for supplying protein in cattle fodder. Further, the preparation of yeast from the molasses is considered preferable to an ammoniation process since thus-treated molasses has some disadvantages as a feeding material. Procedures are described for the preclarification of distillery waste and molasses with ammonium sulphate before inoculation with *Saccharomyces cerevisiae* and *Torula utilis* var Major, respectively, and conversion of the carbohydrate content to a form, i.e. yeast, suitable as fodder. Economics of yeast production are briefly discussed.

* * *

Alkali metal derivatives of sucrose. IV. The problem of 'firmly bound' ammonia. W. A. P. BLACK and E. T. DEWAR. *J. Appl. Chem.*, 1960, **10**, 134–138.—Liquid monomethylamine is inferior to liquid ammonia for the preparation of alkali metal derivatives of sucrose. Sodium is insoluble; lithium dissolves slowly to form a monolithium sucrate which still retains approximately one molecule of methylamine. All but 0·2% of the firmly bound ammonia was removed from a sample of trisodium sucrate by Soxhlet extraction with dimethoxyethane, although part of the sucrate was converted to the sodium hydroxide addition compound. Benzene under strictly anhydrous conditions extracts 44·8% of the bound ammonia without any decrease in sodium content. Optically active sucrose derivatives have been prepared by condensing benzene- and dimethoxyethane-extracted trisodium sucrose derivatives with 2-chloro-4,6-bis (2′-chloro-4′-nitrophenoxy)—*s*-triazine. Penta- and trisodium sucrates, which have not been extracted, give products with a low rotation. The presence of ammonia in sodium sucrate appears to have no effect on the polymerization reaction with epichlorohydrin. γ-Irradiation of a polymer from monosodium sucrate causes a small but definite degradation to water-soluble products containing glucose, fructose and possible organic acids.

Behr particle board plant under consideration. O. WYSS. *Sugar y Azúcar*, 1960, **55**, (1), 32–33.—The Behr-Board dry process of particle board manufacture as will be used in the Taiwan Sugar Company's plant, nearing completion at Kaehsiung, is described. After storage the bales of bagasse, of about 27% moisture content, are broken and the loosened fibres passed through screens, sifters, separators, mills and dryers, the pith being removed as dust. The moisture content is reduced to 5% in special dryers, and the fibres are sent to a mixing machine for mixing with glue. After spreading and forming, the resultant mats are cut to length and treated in a heating press. The raw board is then trimmed, sanded and cured ready for shipment. The plant will have a daily capacity of 55 tons of ¾-inch board usable in the building and furniture industries.

* * *

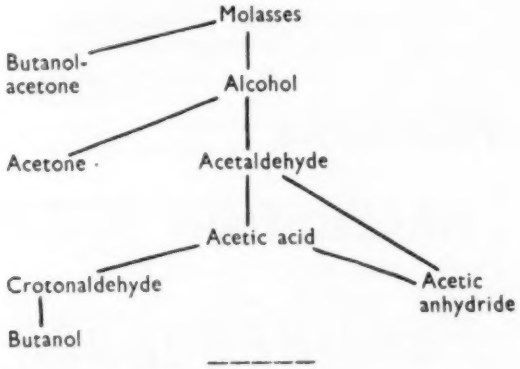
Synthesis of fatty acid-sucrose esters with the use of new solvents. S. KOMORI, M. OKAHARA and E. SHINSUGI. *J. Chem. Soc. Japan, Ind. Chem. Sect.*, 1959, **62**, 220–224; through *S.I.A.*, 1959, **21**, Abs. 957.—Acylpyrrolidones, acylmorpholines, acylpiperidines, etc., were examined for their suitability as solvents for sucrose ester preparation; the solubility of sucrose in such compounds is tabulated. N-methylpyrrolidone and acylpyrrolidones are particularly suitable solvents. Sucrose monolaurate and monopalmitate were prepared from the methyl esters of the fatty acid at varying conditions of temperature (90–100°C), time (2–12 hr) and pressure (10–60 mm of Hg). The optimum formation rate of the monolaurate was at 90°C and 10 mm pressure; increase of pressure lowered the rate of formation. The effects on ester formation of sodium acetate, NaOH, KOH, Na_2CO_3 and K_2CO_3 were also studied.

* * *

Sucrose-modified phenol-formaldehyde resins. R. P. COX. *Amer. Chem. Soc.*, 136*th Meeting*, September 1959, *Abstr. of Papers*, p. 17D; through *S.I.A.*, 1960, **22**, Abs. 58.—Polymers have been prepared by reaction of sodium phenate, sucrose and formaldehyde, followed by precipitation at pH 7. The exact structure of the polymers is unknown, but determination of the phenolic OH and correlation of the % yield with the charge distribution indicates there are three phenol residues per sucrose molecule. With >15% of excess formaldehyde the product is stable for several months, but at elevated temperatures cross linkage occurs and formaldehyde is evolved. Wood-filled mouldings cure in 5–10 min at 310°F to yield products having less than 1% water absorption. The new resins have better (or equivalent) properties of flexing and impact strengths than those of standard phenolic resins.

IMPROVED DISTILLATION EQUIPMENT

FERMENTATION AND BYPRODUCTS INDUSTRIES



Ancillary industries :
Yeast and glucose manufacture

Planning
Projects and Engineering
Construction
Erection
Initial operation

SPEICHIM

Société pour l'Equipement des Industries Chimiques

14 rue la Boétie

PARIS 8 ème FRANCE

GUARANTEED

PROCESS PLANT

FROM OUR LONDON STOCKS

★ HORIZONTAL POWDER MIXER by Gardner, 300 lb. capacity, size GG, mild steel trough 5 ft. x 18 in. x 23 in. deep with safety grill, hinged lid and bottom end slide outlet. Removable broken scroll agitator driven by 2 h.p. motor enclosed in end support pedestal with built-in push button starter.

★ ADELPHI HORIZONTAL POWDER MIXER, 400 lb. capacity, mild steel trough 4 ft. 6 in. x 24 in. x 24 in. with cover, side feed opening and bottom centre outlet. Broken scroll agitator driven by spur gear and pinion and vee pulley from 4 h.p. motor, 6 in. dia. Inclined Worm Feeder with feed boot, flange bolted on to side of trough, drive by 1 h.p. motor.

★ PORCELAIN LINED COBORN BALL MILL, 45 gallons working capacity, mild steel casing 40 in. dia. x 36 in. long, mounted on fabricated end frames with self-aligning plummer blocks. Drive by 3 h.p. motor with push button starter. Ball charge available.

★ NEW JAW CRUSHER by Nikex, single-toggle, 31½ in. x 15¼ in., capacity 25/30 t.p.h. when flywheel rotates at 250 r.p.m. 40/50 h.p. required to drive. Main frame and pitman constructed ribbed cast steel, jaws and cheekplates manganese steel. Forced feed lubricating to bearings, main and pitman bearings water cooled. One flywheel grooved for vee ropes.

★ PORTABLE CRUSHING & SCREENING PLANTS, four-wheel chassis type carrying 16 in. x 9 in. Jaw Crusher and underslung Rotary Screen, Diesel Engine driven. Manufacturers: *Pegson, Parker, Marsden.*

★ VACUUM OVEN by Francis Shaw, 5 ft. 2 in. wide x 8 ft. 9 in. long x 7 ft. high internally with heavy cast iron swing door each end having four corner wheel operated swing clamps, sight glasses, lamps and aircocks. Internal headers with swan neck connections to 17 steam heated platens of welded/riveted construction suitable 40 p.s.i. w.p.
FIVE AVAILABLE, mild steel welded construction.
TWO AVAILABLE cast iron construction.

★ TWIN ROLL BUFLOVAK DRIER by *Consolidated Products, U.S.A.*, 100 in. x 32 in., type 700 serial, rolls suitable 100 p.s.i. w.p. Driven through enclosed chains, reduction gear and vee ropes by 5 h.p. motor. TWO AVAILABLE.

★ SYMONS 'JW' TYPE SCREEN by *Nordberg*, 42 in. x 6 ft., vee belt driven by 5 h.p. S.C. motor by *L.D.C.*, 1440 r.p.m. 400/3/50 cycles. THREE AVAILABLE.

★ CENTRIFUGAL EXTRACTOR by *Broadbent*, 36 in. dia. Lift-out mild steel basket with ¼ in. perforations, three-point suspension, spring balanced lids with safety interlock and hand brake. Underdriven direct coupled 12/13 h.p. motor with auto starter.

These are representative items from our wide range of new and reconditioned Plant. Comprehensive stocks also include:

Power Plant, Machine Tools, Hydraulic Plant, Contractors' Plant, Lifting and Mechanical Handling Equipment

May we put you on our mailing list?

GEORGE COHEN

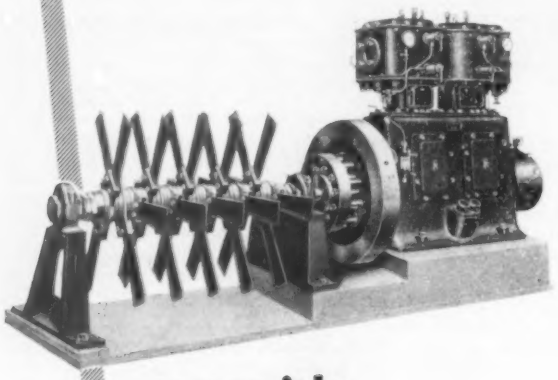
SONS & COMPANY LTD

ESTABLISHED 1834

LONDON, W.12 Cables: OMNIPLANT TELEX, LONDON

TELEX No. 21288/9

PARKER Steam Engines



provide economical power for the Sugar Industry

In factories and refineries throughout the world PARKER steam engines are providing reliable power from process steam at negligible cost. Simple and efficient in design, Parker engines require little maintenance and can be operated by unskilled labour. Unlike turbines Parker engines can be direct coupled without the use of costly reduction gearing and variable speed over side limits can be obtained without complicated control equipment.

Built in sizes from 10 *to* 1,000 *b.h.p.*
PARKER engines are all constructed to give long life with top economy under the most severe operating conditions.

Write now for full specifications and applications to:

ASHWORTH & PARKER LTD

RIVERSIDE WORKS · BURY · LANCS.

SUGAR CANE LOADERS

Broussard Flex-boom hydraulic Loader mounted on Fordson-Major tractor equipped with Manuel 4-wheel drive, loading 80 ton per acre cane in Puerto Rico.

Capacity 2000 lb/minute (under Louisiana conditions) grab capacity (54 in. opening) 1500 lb., load clearance 12 ft., loading radius 10 ft. to 12 ft., boom swing front to right 100°.
The Broussard Heavy Duty tropical type loader is now available for installation on the Caterpillar D-4, International TD-6, Track-Marshall, John Deere 440 crawler and various USA wheel tractors.
It may be easily installed at the destination on tractors already in hand and quickly removed from the tractor at the close of the harvest.

Manufactured by
BROUSSARD MACHINE COMPANY
ST. MARTINVILLE, LOUISIANA

Export Division
LOGAN PERKINS—SUGAR MACHINERY
International Trade Mart, New Orleans, U.S.A.

MEASURE

MACERATION WATER

by

LEA RECORDER

The only efficient way to measure Maceration Water is to measure it *continuously* and to have permanent records of the rate of flow. The most efficient instrument for this purpose is the Lea Recorder, large numbers of which are providing valuable information in Sugar Factories all over the world.

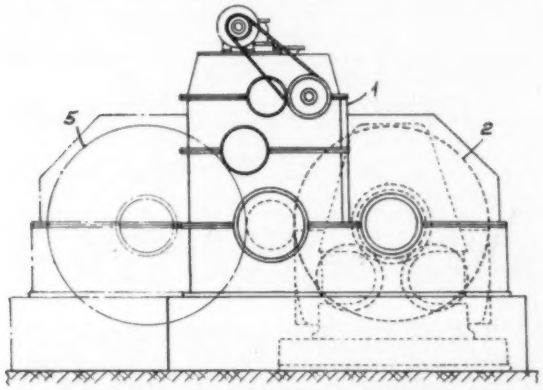
ACCURATE TO WITHIN 1%

Write for literature to:

THE LEA RECORDER Co. Ltd.
Cornbrook Park Road,
MANCHESTER, 15, England.

UNITED KINGDOM

Crushing mills. DUNCAN STEWART & CO. LTD. and K. S. ARNOLD, of Glasgow C.3., Scotland. **833,251.** 17th October 1956; 21st April 1960.—In a develop-



ment of the turbine drive arrangement patented previously[1], the final drive to the mills is enclosed in the gearbox instead of externally and, further, several reduction gears (2,5) may mesh with the same pinion in this box (1).

* * *

Pulping of cellulosic material. BRITISH PAPER AND BOARD INDUSTRY RESEARCH ASSOC., of Kenley, Surrey. **834,006.** 23rd May, 1957; 4th May 1960.—Cellulosic material (bagasse) is subjected to a first digestion at a temperature below the boiling point (~75°C) and at atmospheric pressure with a liquor containing 0·5–7% (3·3%) w./v. caustic soda with or without not more than 25% (5%) sulphidity [defined as $\frac{Na_2S}{NaOH + Na_2S} \times 100\%$, both NaOH and Na_2S being expressed as equivalent Na_2O], for a period of time depending on the temperature (~3 hr), the liquor:material ratio being not less than 3:1. The digested material is separated from the liquor, washed, fresh liquor added to bring the consistency to 4–16%, fiberized [mechanically rubbed so as to resolve the softened aggregate into a fibrous pulp], and subjected to a second digestion (at 75°C for a period less than the first digestion) at atmospheric pressure. The liquor from the second digestion is separated and concentrated for re-use in the first digestion, while the pulp is screened and bleached for fine paper production.

UNITED STATES

Ether esters of sucrose. A. W. ANDERSON, assr. DOW CHEMICAL CO., of Midland, Mich., U.S.A. **2,927,919.** 30th December 1957; 8th March 1960.—Ether esters of carboxylic acids, having herbicidal, antimicrobial and fungicidal properties, are of general formula

$$R'\text{-}O\text{-}CH_2\text{-}\underset{\displaystyle OH}{CH}\text{-}CH_2\text{-}O\text{-}(R''\text{-}O)_n\text{-}CH_2\text{-}\underset{\displaystyle OH}{CH}\text{-}CH_2\text{-}O\text{-}\overset{\displaystyle O}{\overset{\|}{C}}\text{-}R$$

where R is an organic monovalent aliphatic or aromatic (benzene series) radical containing 1–9 carbon atoms (phenoxy-aliphatic, halo-aliphatic, alkyl or alkenyl, 2,4,5-trichlorophenoxyalkyl, 2,4-dichlorophenoxyalkyl or bromomethyl), R′ is a hydroxyalkyl sucrose residue containing 8–10 oxyalkylene groups each of which has 2–4 carbon atoms, and R″ is an alkylene radical having 2–4 carbon atoms (2,3) and *n* an integer from 2–20 (10,8). The ether esters are prepared by reacting equimolecular proportions of a diglycidal ether of a polyglycol, of formula

$$CH_2\text{—}\underset{\displaystyle O}{CH}\text{—}CH_2O\text{—}(R'O)_n\text{—}CH_2\text{—}\underset{\displaystyle O}{CH}\text{—}CH_2$$

with an organic acid of formula R-COOH and a hydroxyalkyl sucrose having 8–10 oxyalkylene groups per sucrose molecule, in the presence of a catalyst and at 60–100°C.

* * *

Glutamic acid recovery. F. A. HOGLAN, of Glenview, Ill., U.S.A., assr. INTERNATIONAL MINERALS & CHEMICAL CORP. **2,933,524.** 28th January 1957; 19th April 1960.—Glutamic acid precursors in Steffen's or barium filtrate are hydrolysed at elevated temperature (60°–95°C) under alkaline conditions, and mixed with a substance (CO_2) which will convert alkaline earth (Ca) compounds into insoluble materials ($CaCO_3$). These are separated and the hydrolysate acidified with sulphuric acid to pH 5–9 followed by concentration to 40–65% dissolved solids by weight. Inorganic salts are separated and the pH lowered to 2·5–3·5 by adding sulphuric acid. The liquor is concentrated to 65–85% dissolved solids and a mixture of inorganic salts containing sulphuric acid values with glutamic acid is separated at a temperature above 65°C. This is at least partly returned to the hydrolysate for the previous acidification to pH 5–9, so recovering the glutamic acid therein. The liquid phase is diluted to 60–80% (60–65%) solids and cooled to below 35°C, whereupon glutamic acid crystallizes.

[1] U.K.P. 699,432; *I.S.J.*, 1954, **56**, 173.

Copies of Specifications of United Kingdom Patents can be obtained on application to H.M. Patent Office, 25 Southampton Buildings, London, W.C.2. (price 3s. 6d. each) United States patent specifications are obtainable from: The Commissioner of Patents, Washington, D.C. (price 25 cents each).

TRADE NOTICES

Statements published under this heading are based on information supplied by the firm or individual concerned. Literature can generally be obtained on request from the address given.

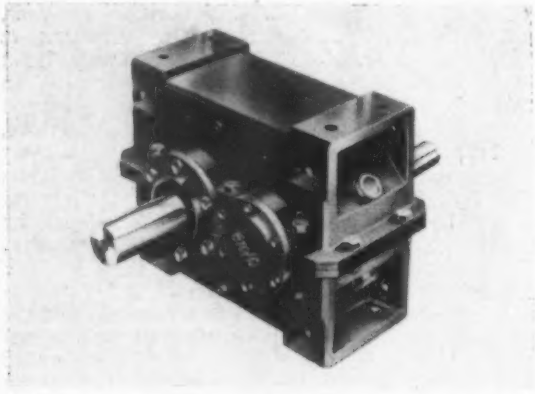
Automatic Polarimeter. Carl Zeiss, Oberkochen/Württemburg, Germany; Degenhardt & Co. Ltd., 6 Cavendish Square, London W.1.

The Zeiss automatic polarimeter consists of three units, a power supply unit, an amplifier and a polarimeter unit. It operates by means of a photo-electric measurement of the optical rotation and gives a direct reading on the sugar scale of the polarization of a sample to an accuracy of 0·05°S with clear solutions and 0·1°S for dark solutions. Up to 120 analyses can be carried out per hour by one operator who need not be specially trained for the work. Advantages include long life of the photo-electric receiver and electronic valves, and easy replacement of all the parts with a limited life, for instance the mercury lamp which has a life of approximately 500 hours.

* * *

"Par-O-Mount" gear units. Crofts (Engineers) Ltd., Thornbury, Bradford 3, Yorks.

Complete universality of mounting is the outstanding feature of the new Crofts "Par-O-Mount" gear units which are of two types—single reduction worm gears and single reduction single helical gears. Each is adaptable to a wide variety of mounting positions, shaft dispositions and ratios of speed reduction. Gear cases have integrally cast feet, machined and drilled on all faces. The worm gear



case is of one-piece construction, while that for the single helical gear consists of two halves, machined and bolted together as illustrated. Seven sizes of worm gear, up to 5 inch centres, cater for powers up to 25 h.p., stock ratios being 5:1 to 70:1. The single helical gears are available from 3 to 10-inch centres, with standard ratios up to 6:1 for powers up to 600 h.p.

PUBLICATIONS RECEIVED

MIRRLEES CHAINS AND SLATS. The Mirrlees Watson Co. Ltd., 45 Scotland Street, Glasgow C.5., Scotland.

Strength and reliability are features of Mirlees cane carrier parts—chains, slats and sprockets—which are described and illustrated in a new leaflet which includes dimensions and specification data.

* * *

ROLLER CHAINS AND SPROCKETS. Link-Belt Company, Prudential Plaza, Chicago 1, Ill., U.S.A.

A new 44-page catalogue, Book 2757, lists over 2000 types and sizes of stock roller chains and sprockets including standard and double pitch power transmission chains, a large selection of conveyor chains and attachments and a wide range of sprockets. Included are stock sizes of single, double, triple and quadruple strand chains, heavy series roller chains, stainless steel and bronze roller chains, double pitch roller chains, flat-top conveyor chains and leaf chain, five types of sprockets and the RC roller chain flexible couplings.

* * *

INSTRUMENTS. Cambridge Instrument Co. Ltd., 13 Grosvenor Place, London S.W.1.

A new leaflet, Reprint E4, provides addresses of the world-wide organization for Cambridge instruments, as well as a summary of the complete range of equipment—mechanical and electrical indicators, recorders and controllers for industry, electronic recorders and recorder-controllers, and medical and physiological instruments as well as laboratory instruments for electrical, electrochemical and mechanical measurements. Separate leaflets—lists 256/3, 176, and 304/1—describe and illustrate, respectively, Weston saturated-type standard cells, thermometer regulators, and a needle pyrometer.

* * *

COMMANDER BOILER TEST INDICATOR. George Kent Ltd., Luton, Beds.

Publication 365, dated March 1960, illustrates and describes the Kent "Commander" boiler test indicator for measuring steam turbine condensate flow and boiler feedwater flow. The instrument may be panel mounted or carried on a transportable assembly.

* * *

PRESSED SUGAR BY STANDARD. Standard Steel Corporation, 5001 Boyle Avenue, Los Angeles 58, Calif., U.S.A.

The Standard-Hersey pressed sugar process is described in a new catalogue, No. 603, available from Standard Steel Corporation. It contains technical data on the Standard-Hersey cube presses, and lists the various sizes of tablets, blocks, cubelets and bars which can be produced with them. A description of a complete cube sugar system, along with specifications of the various components is included. Information is also contained on Standard rotary dryers and coolers for the sugar industry.

* * *

John McNeil & Co. Ltd.—For the first time for many years this Journal does not carry an advertisement for John McNeil & Co. Ltd., of Govan, Glasgow S.W.1. This, we regret to report, is because this old-established manufacturer of sugar machinery has ceased business as of the 15th May 1960.

THRO' THE MILL—ON PENNINE CHAIN

Carrying buckets

Pennine make two chains suitable for bucket elevator service. The popular and widely used No. 88 Ewart-type detachable chain for normal service is easily assembled and uncoupled because of its hook construction. This chain must be run with the sprocket against the closed side of the hook.

A stronger chain also recommended for this work is Pennine Combination Chain—a combination of malleable iron centre-links and high-carbon steel side-bars. Both these chains require K1 or K2 links spaced at intervals for elevator bucket attachment.

Sugar production runs smoother on

Pennine chain

Catalogues on request: PENNINE CHAINBELT CO. LTD., ARMLEY, LEEDS 12, ENGLAND

We have sold our patented

SUGAR TABLET OR CUBE INSTALLATIONS

all over the world.

Cubes from dry granulated

The small machine with the big output!

Very low capital outlay

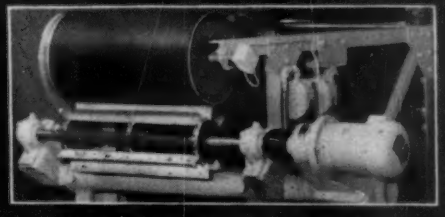
Send for information to:

GOKA N.V.
MACHINE WORKS
Established 21 years
AMSTERDAM
HOLLAND
P.O. Box No. 130
Tel: 222255–222256
Telex: 14173 "Kagodam"

The Famous Kez-Strip Conveyor Belt Brush

Now-

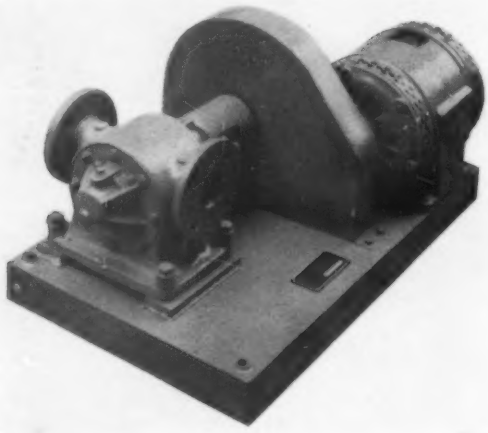
complete in combination with our K·A·M UNIT



Showing the Unit in position ready for action. Micro-adjustable. Flameproof. Anti-static features can be incorporated. Little, if any, guarding required.

INDUSTRIAL DIVISION
THE Kleen-e-ze BRUSH CO. LTD
83 BEVAN LANE, HANHAM, BRISTOL

A Suma Product



MOLASSES PUMPS

The design of molasses pumps is a specialist's job, and the gun-metal, vane-type model illustrated here is one of the most successful. Sizes vary from 1½ in. to 4 in. with horse-power requirements of 1.5—7.5 and approximate throughputs of 3—20 tons per hour. To avoid cavitation, slow speeds are employed, the capacity varying with the temperature and viscosity of the molasses. The pump may be jacketed for heating if desired, and is suitable for direct or belt drive.

FOR FULLER DETAILS, SEE PAGE 81 OF THE SUMA CATALOGUE, WHICH WE WILL GLADLY SEND

The Sugar Manufacturers' Supply Co. Ltd.

7 & 8, IDOL LANE, LONDON, E.C.3, ENGLAND.

Cables: "Sumasuco, London."

REDUCING VALVES

in

GUNMETAL

CAST IRON or

STEEL

Available for

Steam, Water, Air

or Gas

Sizes ½ in. upwards

G. & A. E. SLINGSBY LTD.

Phone 20601 (5 lines)

CLEVELAND STREET

HULL

Phone 20601 (5 lines)

GILMORE SUGAR MANUALS

MANUAL AZUCARERO DE CUBA

THE CUBA SUGAR MANUAL

(In Spanish). Published Annually—1959 Edition now available.

THE HAWAII SUGAR MANUAL

Published every Third Year—1957 Edition now available.

THE PUERTO RICO SUGAR MANUAL

(including Dominican Republic and Haiti)

Published every other year—1959 Edition now available.

THE LOUISIANA-FLORIDA SUGAR MANUAL

Published every other year—1959 Edition available.

Each $10.00 per copy (post paid)

★ *Detailed Technical Surveys on Agricultural and Manufacturing Practices of the Cane Sugar Industry*

GILMORE PUBLISHING CO., INC.

525 Audubon Bldg., New Orleans 16, Louisiana, U.S.A.

Canadian Sugar Imports[1]

Raw sugar imported by refiners	1959 *tons*	1958 *tons*	1957 *tons*
Australia	173,072	121,612	108,790
Fiji	54,923	49,084	51,803
Mauritius	86,880	63,143	92,079
Cuba	78,057	183,427	80,883
Dominican Republic	—	3,201	—
British Guiana	87,365	99,128	79,983
Jamaica	112,726	71,406	107,394
Leeward & Windward Islands	17,509	11,600	11,650
Trinidad	24,616	25,913	19,262
Barbados	27,820	13,000	42,359
South Africa	5,000	—	—
	667,968	641,514	594,203
Raw sugar N.O.P.			
British Guiana	3,411	4,213	3,789
Cuba	8,145	7,069	5,937
Barbados	3	1	—
Jamaica	—	—	1
	11,559	11,283	9,727
Refined sugar			
United Kingdom	3	2	52
United States	81	8	34
Mexico	—	2,946	12,330
Holland	—	600	448
Czechoslovakia	—	5	—
Barbados	500	—	—
	584	3,561	12,864

[1] *Dominion Bureau of Statistics*, through C. Czarnikow Ltd, *Sugar Review*, 1960, (453), 76.

West Indies sugar production.—The following estimates of production and local consumption in 1960 compared with final figures for the previous two years were issued by the West Indies Sugar Association on 4th April 1960.

	Production		
Long tons	1960 *Estimate*	1959	1958
Antigua	20,000	28,695	21,983
Barbados*	135,000	184,152	152,847
British Guiana	305,000	284,425	306,361
Jamaica	413,300	376,042	345,535
St. Kitts	47,000	46,441	42,169
St. Lucia	6,800	6,931	8,198
Trinidad	191,600	181,131	187,500
	1,118,700	1,107,817	1,064,593
St. Vincent	4,100	4,122	4,281
	1,122,800	1,111,939	1,068,874
	Consumption		
	1960 *Estimate*	1959	1958
Antigua	1,800	1,975	1,597
Barbados*	10,500	11,670	12,038
British Guiana	19,000	19,280	18,723
Jamaica	62,000	60,974	60,934
St. Kitts	4,800	4,584	4,648
St. Lucia	1,920	1,731	1,907
Trinidad	30,000	28,873	27,808
	130,020	129,087	127,655
St. Vincent	2,900	2,916	2,902
	132,920	132,003	130,557

* Includes fancy molasses.

European Sugar Beet Area, 1960/61

F. O. Licht's First Estimates[1]

	Hectares			
Western Europe	1960/61	1959/60	1958/59	1957/58
West Germany	297,000	295,355	289,417	257,700
Austria	50,000	54,845	50,004	42,714
France (*a*)	375,000	354,000	330,600	313,212
Belgium	67,500	68,000	69,296	65,951
Holland	90,000	92,586	81,007	64,511
Denmark (*b*)	50,000	50,377	68,878	69,412
Sweden	49,437	51,412	50,305	53,579
Italy	230,000	302,000	264,490	223,636
Spain	175,000	188,100	159,112	115,000
Yugoslavia	85,000	80,000	60,905	76,431
Switzerland	5,400	5,433	5,699	5,598
Great Britain	167,000	166,365	167,345	164,009
Eire	31,000	27,461	33,829	28,703
Finland (*c*)	16,000	14,189	13,125	11,849
Turkey	197,718	166,993	143,522	148,265
Total	1,886,055	1,917,116	1,787,534	1,640,570
Eastern Europe				
East Germany	215,000	225,000	220,900	218,997
Czechoslovakia	230,000	230,000	227,149	221,880
Hungary	125,000	118,853	103,815	80,720
Poland	400,000	369,000	357,900	336,000
Roumania	210,000	201,400	141,400	131,400
Bulgaria	80,000	77,000	75,000	70,000
U.S.S.R.	3,200,000	2,950,000	2,494,900	2,150,000
Total	4,460,000	4,171,253	3,621,064	3,208,997
Europe excluding U.S.S.R.	3,146,055	3,138,369	2,913,698	2,699,567
Europe including U.S.S.R.	6,346,055	6,088,369	5,408,598	4,849,567

(*a*) Excluding beet area for production of alcohol.
(*b*) Including area for sugar beet grown to export to other countries.
(*c*) Excluding area for sugar beet grown in other countries.

Sugar factory for Nigeria.[2]—A new sugar factory to the value of £5m is to be erected near Bacita in the province of Ilorin. Annual production capacity will be 40,000 tons of refined sugar.

* * *

Hawaii sugar crop[3].—As an after-effect of the 1958 strike in Hawaii, the sugar produced per acre in 1959 was the lowest in ten years at 8·83 tons. A total of 974,632 tons of sugar was obtained (764,953 tons in 1958 and 1,084,646 tons in 1957) from 9,416,225 tons of cane (7,552,750 tons and 9,447,647 tons) harvested from 110,371 acres (84,136 acres and 106,742 acres).

* * *

Glutamic acid in Japan[4].—At present, glutamic acid monosodium salt is being produced at eleven factories in Japan. Production in 1958 was 13,513 tons of which 3799 tons were exported to Holland, 863 tons to Hong Kong, 481 tons to West Germany, 286 tons to the Philippines, 284 tons to the U.K., 260 tons to Thailand, 199 tons to Switzerland, 170 tons to the U.S.A., 151 tons to France, 122 tons to Singapore, 100 tons to the Ryukyu islands and 87 tons to Hawaii.

* * *

French West Indies production, 1958/59[5].—Sugar production in Guadeloupe reached 141,692 metric tons, *tel quel*, in the 1958/59 campaign, as compared with 117,057 tons in the previous campaign. The cane milled amounted to 1,534,027 tons as against 1,335,620 tons in 1957/58. Sugar production in Martinique in the 1958/59 campaign was 76,805 metric tons, *tel quel*, compared with 66,853 tons in the previous. The cane milled totalled 906,092 tons compared with 798,304 tons in 1957/58.

[1] *International Sugar Report*, 1960, **92**, (Supp. 8), 95.
[2] F. O. Licht, *International Sugar Report*, 1960, **92**, (Supp. 4), 53.
[3] *Willett & Gray*, 1960, **84**, 89.
[4] *Zeitsch. Zuckerind.*, 1960, **85**, 143.
[5] F. O. Licht, *International Sugar Report*, 1960, **92**, (Supp. 6), 78.

BREVITIES

Sugar Research Foundation changes.—Dr. JOHN L. HICKSON, who joined the Sugar Research Foundation in 1953, has been elected Vice-President and Scientific Director, succeeding Dr. H. B. HASS who has resigned as President of the Foundation but will continue to serve as a consultant.

* * *

Italy beet crop, 1959/60[1].—Sugar beet production in Italy for the 1959/60 crop amounted to about 11,400,000 metric tons, as compared with 7,688,500 tons in the previous campaign, according to provisional figures issued by the Central Statistical Institute. Some 400,000 tons have been directed for use as cattle feed as against 237,000 tons in 1958/59.

* * *

Mauritius sugar exports, 1959[2].—Total sugar exports in 1959 were 507,086 metric tons, including 393,617 tons to the U.K. (59,541 tons of 1958/59 crop and 334,076 tons of 1959/60 crop sugar), 87,960 tons to Canada (9804 and 78,156 tons), 6553 tons to Nyasaland (1016 and 5537 tons), 1575 tons to Singapore, 1118 tons to Malaya, 8839 tons to Hong Kong, and 7424 tons to Lebanon (the last four all 1959/60 crop sugar).

* * *

Colombian sugar expansion[3].—The twenty-one sugar factories of Colombia produced 270,000 metric tons of sugar in 1959 compared with 223,000 tons in 1958. In view of the steady increase in production it should not be necessary to import sugar during 1960. In 1958 it was necessary to import 40,000 tons to cover domestic consumption; this figure was reduced to 2000 tons in 1959, and production in 1960 is expected to satisfy the estimated consumption of 295,000 tons,

Belgian sugar crop 1959/60[4].—Sugar production from the 1959/60 campaign amounted to 211,949 metric tons, raw value, compared with 456,663 tons in 1958/59—a reduction of 53·59%.

* * *

New factory for Vietnam[5].—A sugar factory is to be erected at Dong-Bo in the province of Phu Yen in South Vietnam. It will have a capacity of 20,000 tons of sugar per year and will be expanded later to 30,000 tons.

* * *

French sugar factories for the U.S.S.R.[6].—On the 23rd December a contract was signed in Moscow for the construction of three sugar factories of 5000 tons capacity each by Soc. Fives Lille-Cail. The factories are to be delivered in 3 years.

* * *

New Bulgarian sugar factory[7].—A new sugar factory near Varna in north-east Bulgaria will be completed in 1961. It is to have a capacity of 2000 tons of beet per day, some 65% of the machinery being supplied from Bulgaria, the remainder coming from East Germany and Czechoslovakia and elsewhere.

* * *

Egyptian sugar factory[8].—Machinery for the new sugar factory at Edfu is to be delivered by a Japanese firm and will cost about £E8 million. It is to be put into operation in 1962 and will have an initial production capacity of 40,000 tons, later perhaps being increased to 80,000 tons.

* * *

Sugar factory proposals for the U.P.[9].—The contribution of Uttar Pradesh to the 3·2m tons sugar target of the Indian Third Five-Year Plan is 1·5m tons. Present capacity is inadequate to produce this quantity and the working group for the U.P. sugar industry has made proposals, approved by the Heavy Industries Plan Committee and the State Ministry of Industries, for the establishment of six new sugar factories having a total of 6000 tons daily crushing capacity.

* * *

Irish sugar for export[10].—The Irish Sugar Co. Ltd. is seeking new markets for its exportable sugar surplus which amounts to 34,000 tons. At present possibilities are being explored for the erection of a fifth sugar factory. As farmers now grow more and better sugar beet, the existing four factories have during the past few years raised their daily processing capacity from 6,800 to 10,000 tons.

* * *

The late R. J. S. Muir.—The death occurred on the 25th April of Mr. R. J. S. MUIR, C.M.G., General Secretary of the Australian and Queensland Cane Growers' Councils. Mr. MUIR's family were connected with the sugar industry but it was not until after discharge from the first A.I.F. that he became a Cane Inspector in Mackay, from which he became Cane Inspector at Hambledon Mill and then Secretary of the Innisfail District Cane Growers' Committee. After serving as Chief Cane Inspector at Mulgrave Mill and Manager of the Falkiner Cane Harvester Co. he became Assistant Secretary of the Queensland Cane Growers' Council in 1930 and General Secretary in 1938. He represented the Council on many occasions as a member of various Commissions, etc., and took part in the British Commonwealth Sugar Agreement talks each year from 1948 to last year as well as being an Australian representative at the International Sugar Conferences of 1953, 1956 and 1958.

Stock Exchange Quotations

CLOSING MIDDLE

London Stocks (*at 20th May*, 1960)

Anglo-Ceylon (5s)	17/7½
Antigua Sugar Factory (£1)	16/3
Booker Bros. (10s)	35/6
British Sugar Corp. Ltd. (£1)	22/–
Caroni Ord. (2s)	4/4½
Caroni 6% Cum. Pref. (£1)	17/6
Distillers Co. Ltd. (6s. 8d. units)	34/3
Gledhow Chaka's Kraal (£1)	50/–
Hulett & Sons (£1)	61/–
Jamaica Sugar Estates Ltd. (5s units)	4/7½*
Leach's Argentine (10s units)	15/–
Reynolds Bros. (£1)	45/–
St. Kitts (London) Ltd. (£1)	17/6
Ste. Madeleine (Ord.) (£1)	28/9
Sena Sugar Estates Ltd. (10s)	17/–
Tate & Lyle Ltd. (£1)	56/3
Tate & Lyle Investments Ltd. (5s)	11/1½
Trinidad Sugar (5s stock units)	27/6
United Molasses (10s stock units)	41/9
West Indies Sugar Co. Ltd. (£1)	18/6

*ex 50% Capitalization.

CLOSING MIDDLE

New York Stocks (*at 19th May*, 1960)	$
American Crystal ($10)	37½
Amer. Sugar Ref. Co. ($100)	26⅝
Central Aguirre ($5)	21⅝
Cuban American ($10)	15
Great Western Sugar Co.	27
South P.R. Sugar Co.	15⅛
United Fruit Co.	21½

[1] C. Czarnikow Ltd., *Sugar Review*, 1960, (449), 60.
[2] *Mauritius Sugar News Bull.*, 1960, (99).
[3] *Fortnightly Review* (Bank of London & S. America Ltd.). 1960, **25**, 436–7.
[4] *Sucr. Belge*, 1960, **79**, 242.
[5] F. O. LICHT, *International Sugar Report*, 1960, **92**, (3), 30.
[6] *Bull. C.E.D.U.S.*, 1960, (8), 19.
[7] *Sucr. Belge*, 1960, **79**, 242.
[8] F. O. LICHT, *International Sugar Report*, 1960, **92**, (Supp. 5), 65.
[9] *Indian Sugar*, 1960, **9**, 568.
[10] *Zeitsch. Zuckerind.*, 1960, **85**, 142.

Photo showing a portion of the G-8 48" automatic white and intermediate sugar centrifugals at Spreckels Sugar Company, Spreckels, California.

2719

THE LARGEST BEET SUGAR FACTORY IN THE U. S. A.

The Spreckels Factory, Spreckels, California, produces 20,000 bags (100 lbs. ea.) of refined white sugar per day. The entire centrifugal equipment for white, intermediate, and low raw is of Western States manufacture.

TWENTY-NINE *COMPLETELY AUTOMATIC* ROBERTS CENTRIFUGALS

A tribute of confidence. A tribute which we accepted with full realization of the accompanying obligation.

THE WESTERN STATES MACHINE CO.

HAMILTON, OHIO, U.S.A.

To keep the lead . . . we think ahead.

Index to Advertisers

	PAGE
American Factors Associates Ltd.	li
Ashworth & Parker Ltd.	xlvi
F. W. Berk & Co. Ltd.	xliv
Blairs Ltd.	Inside Front Cover, xxvii
Braunschweigische Maschinenbauanstalt	xxxi
Thomas Broadbent & Sons Ltd.	i
Broussard Machine Co.	xlvi
David Brown Corp. (Sales) Ltd.	xvi
Buckau R. Wolf A.G.	xiii
Buell Ltd.	liii
Cary Iron Works	liv
George Clark & Son (Hull) Ltd.	vi
Clydesdale Chemical Co. Ltd.	li
Cochran & Co., Annan, Ltd.	xli
Cocksedge & Co. Ltd.	xxxvii
George Cohen, Sons & Co. Ltd.	xlv
A. F. Craig & Co. Ltd.	xxxii
Crofts (Engineers) Ltd.	xxxviii
AB De danske Sukkerfabrikker	xxii
Dorr-Oliver Inc.	Inside Back Cover
Electromagnets Ltd.	ii
Escher Wyss Ltd.	vii
Ewart Chainbelt Co. Ltd.	l
Farrell-Birmingham Co. Inc.	lvi
Ferguson Perforating & Wire Co.	lii
Fisons Pest Control Ltd.	xxv
Soc. Fives Lille—Cail	viii
George Fletcher & Co. Ltd.	Outside Back Cover
Flexible Drives (*Gilmans*) Ltd.	xxxix
Fontaine & Co.	l
Goka N.V.	xlvii
E. Green & Son Ltd.	xxxv
Gruendler Crusher & Pulveriser Co.	ix
N. A. Helmer	l
Robert Hudson Ltd.	lii
John King & Co. (Leeds) Ltd.	liii
Kleen-e-zee Brush Co. Ltd.	xlvii
Lea Recorder Co. Ltd.	xlvi
Link-Belt Co.	xvii
E. C. Masson	l
Mirrlees Watson Co. Ltd.	iii, xl
Norit	xlii
Paterson Engineering Co. Ltd.	xliii
Pennine Chainbelt Co. Ltd.	xlvii
Pott, Cassels & Williamson Ltd.	xxx
Ransomes, Sims & Jefferies Ltd.	xiv
Renold Chains Ltd.	xix
Sackfilling & Sewing Machine Syndicate Ltd.	iv
Salzgitter Industriebau G.m.b.H.	v
Salzgitter Maschinen A.G.	x
Sandvik Steel Band Conveyors Ltd.	xii
Saunders Valve Co. Ltd.	xviii
Richard Simon & Sons Ltd.	liv
G. & A. E. Slingsby Ltd.	xlviii
A. & W. Smith & Co. Ltd.	xxviii, xxix
Sparkler Manufacturing Co.	xxxvi
S.P.E.I. Chim.	xlv
Spencer (Melksham) Ltd.	xx
Duncan Stewart & Co. Ltd.	xxxiii
Stork-Werkspoor N.V.	xi
Suchar Sales Corporation	xxxiv
Sugar Manufacturers' Supply Co. Ltd.	xliv, xlviii
John Thompson Water Tube Boilers Ltd.	xxi
Watson Laidlaw & Co. Ltd.	xxiv
Western States Machine Co.	xlix
Yorkshire Imperial Metals Ltd.	xv

FOR BUYERS' GUIDE SEE JANUARY ISSUE pp. xli-liv

"Ditmar" Transmission Boiling Recorder

Excerpt from letter:

"The direct indication of what happens in the pan is to be considered of such great importance, that the acquisition not only is to be recommended but may be considered urgent."

DITMAR ZONEN N.V. NAARDEN HOLLAND.

N. A. HELMER

Member A.S.M.E.

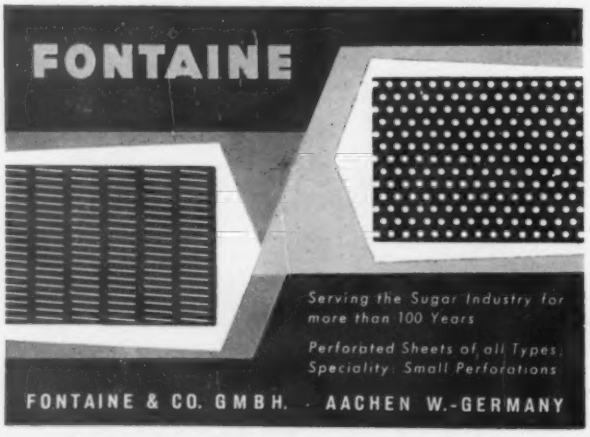
CONSULTING ENGINEER

Representing

The Mirrlees Watson Company Limited, Glasgow, Scotland

Pott, Cassels & Williamson Limited, Motherwell, Scotland

POST OFFICE BOX 54—PLAINFIELD, N.J., U.S.A.


FONTAINE
Serving the Sugar Industry for more than 100 Years
Perforated Sheets of all Types; Speciality: Small Perforations
FONTAINE & CO. GMBH. · AACHEN W.-GERMANY

QUALIFIED SUGAR CHEMIST, experienced in Cane and Beet Sugar, Soil Survey, Pests Control and Distillery seeks position. Please reply to Box 414, *The International Sugar Journal Ltd.*

SUGAR PROJECT SUPERVISOR—Middle East Location—10,000 Acre Irrigated Plantation and Matching Mill and Refinery—Responsible General Management Experience and Familiarity Budgets and Costs Required—Ability to Manage Entire Enterprise Either Supervising Contractors or Direct Operation—Salary Open Depending on Record and Capacity—2 Year Contract, Transportation Expense Immediate Family, Other Benefits—*Development and Resources Corporation, 50, Broadway, NEW YORK 4, N.Y.*

E. C. MASSON Member A.S.M.E. CONSULTING ENGINEER

CANE SUGAR MILLS & REFINERIES

Engineering & Construction — Improvements & Expansion

FACTORY AUTOMATION

P.O. Box 45-484 MIAMI 45, FLORIDA U.S.A. Telephone: Highland 3-3025

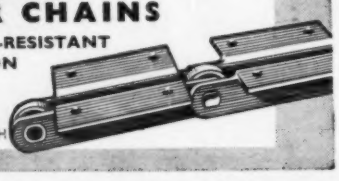
Cables: NOSSAM

EWART CHAINBELT COMPANY LTD. DERBY · ENGLAND

CARRIER CHAINS

IN CORROSION-RESISTANT MALLEABLE IRON

STEEL CHAINS UP TO 140,000 LB. BREAKING STRENGTH



INTERNATIONAL

- **Sugar Consultants**
- **Agricultural Property Management**
- **Agricultural Development**

SPECIALIZING IN THE DESIGN, CONSTRUCTION AND OPERATION OF SUGAR INDUSTRIES

AFFILIATED COMPANIES

AMERICAN FACTORS, LTD.
KEKAHA SUGAR CO., LTD.
OAHU SUGAR CO., LTD.
OLAA SUGAR CO., LTD.
PIONEER MILL CO., LTD.
THE LIHUE PLANTATION CO., LTD.
WAIAMEA SUGAR CO., LTD.

Brochure available on request.

AMERICAN FACTORS
Associates, Limited

Offices:

Queen and Fort Streets
Honolulu 1, Hawaii

215 Market Street
San Francisco 5, California

FOR SALE

COMPLETE RAW SUGAR FACTORY WITH STEEL BUILDING

includes Knives, 15 roll 24 × 42 Mill, Furnaces equipped with new Liptak Arches, Bach Subsider, Eimco Filter, Repair workshop and chemical Laboratory. Plant capacity 750 tons cane per day; thoroughly maintained, now taking off 1960 Crop.

Full particulars obtained from:

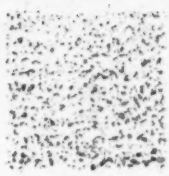
ROSE HALL LIMITED

MONTEGO BAY,
JAMAICA W.I.

is yours a

DECOLOURISING

problem



. . specify

ACTIBON

THE HIGHLY ACTIVATED DECOLOURISING CARBON

IT'S CRYSTAL CLEAR

THE CLYDESDALE CHEMICAL CO., LTD.

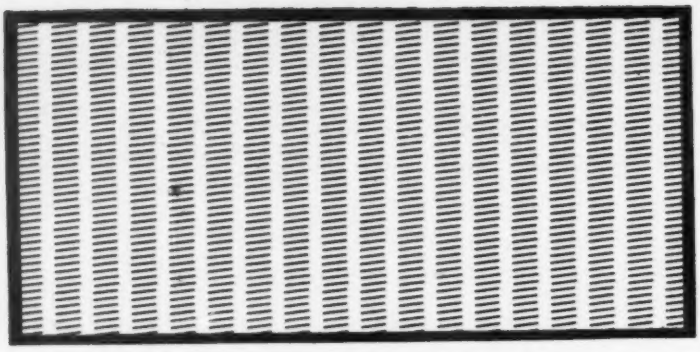
SALES OFFICE
142 QUEEN STREET, GLASGOW, C.1.
Phone : **Central 5247-8** *Grams :* **"Cactus" Glasgow**

Keep More Sugar

in the Basket

with the Improved

FERGUSON



conical slot centrifugal screens

.011 Inches Wide on Inside Surface

.016 Inches Wide on Outside Surface

FERGUSON PERFORATING & WIRE CO.

Write for Our New Catalogue

130-140 Ernest Street
Providence 5, Rhode Island, U.S.A.

Agents—
Cuba—Iberia Machinery Co., P.O. Box 3408, Havana, Cuba.
Puerto Rico—William Munch, Inc., P.O. Box 1952, San Juan.
Mexico—Equipos Azucareros S.A., Balderas 36-Despacho 703, Mexico, D.F.
Brazil—Kropsch & Comp. Ltd., Rua Buenos Aires 81, 4° AND., Rio de Janeiro.
Hawaii—P. S. Pell & Co. Ltd., P.O. Box 1441, Honolulu 6.
Philippines—The Edward J. Nell Company, P.O. Box 612, Manila.
Argentina—Armando S. Villasuso, Munecas 110, Tucuman.

Pioneering in CANADA...

New tunnels and mines are leading even further into the heart of Canada's mineral wealth. New techniques, saving time on construction, maintenance and replacement are helping to develop this vast country faster than ever before. In Canada, as in many other lands, Hudson's constantly give and gain experience to the benefit of light railway equipment in every sphere.

Hudson
LIGHT RAILWAY MATERIALS

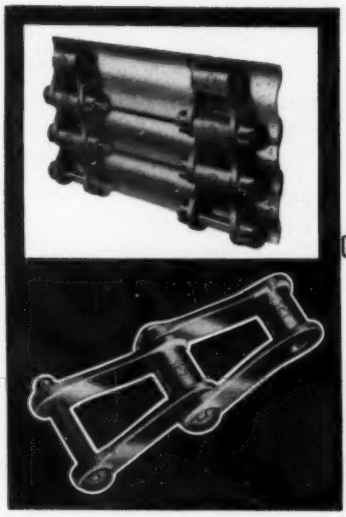
ROBERT HUDSON LTD.,
RALETRUX HOUSE, MEADOW LANE, LEEDS
Telephone: Leeds 20004.
Telegrams: Raletrux, Leeds.

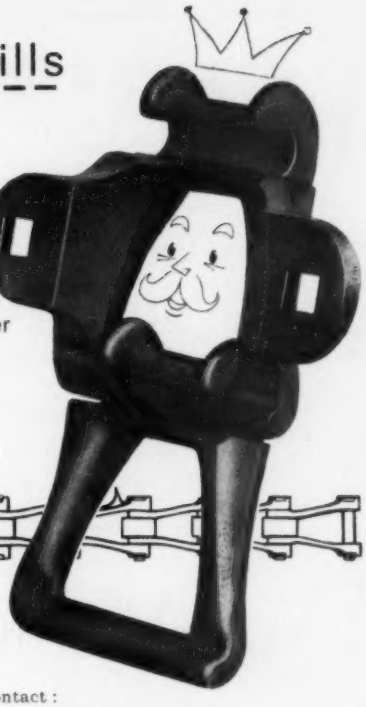
LONDON OFFICE: 30-34, BUCKINGHAM GATE, WESTMINSTER, LONDON, S.W.1 WORKS AT LEEDS, BENONI, DURBAN AND CALCUTTA

Equipment Specialists for Sugar Mills

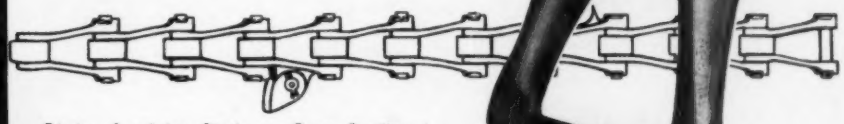
JOHN KING of LEEDS

'Climax' malleable iron has greater comparative resistance to sugar acid corrosion, whilst our special 'Klimal' metal combines this important feature with longer wearing and higher anti-shock qualities.





CARRIER SLATS — *Standard sizes and shapes available for all sugar carrier chains. Close working faces prevent material jamming between slats.*



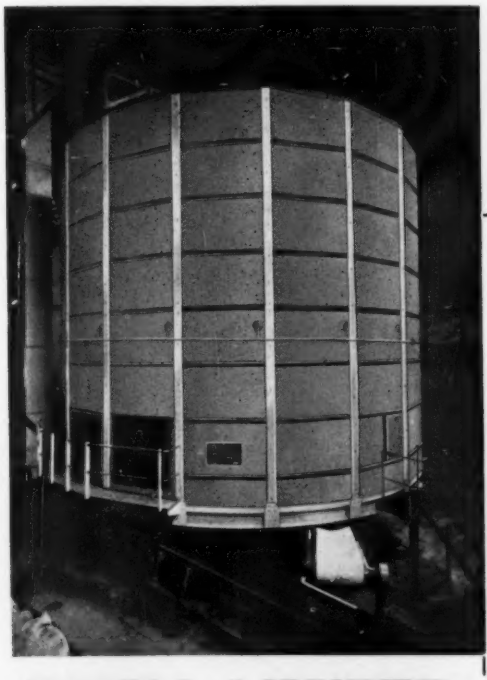
Chains for Juice Strainers, Cane Feeding Tables, etc., etc.

For details regarding any equipment or information about any special problems contact :

JOHN KING & CO. (LEEDS) LTD. GARNET ROAD, LEEDS 11

Phone: 75414 (4 lines) Grams: Malleable Leeds 11

We can supply Elevators · Conveyors · Hoppers · Bunkers and Buckets of all types



BUELL LIMITED

(a subsidiary of Edgar Allen & Co. Limited)

THREE ST. JAMES'S SQUARE · LONDON S.W.1

Telegrams: Allentare Piccy, London.

Telephone: Trafalgar 2528 (3 lines).

BUELL

Trade Mark

"TURBO" TRAY DRYER-COOLERS

Operating on the original "Büttner" system these machines carry the sugar crystals in a shallow bed on superimposed annular shelves exposing a large and frequently changing surface to the drying or cooling air. Restricted movement and absence of tumbling action at the critical stages avoids degradation, preserves the brilliance of the crystal faces and reduces dust emission.

Latest designs incorporate anti-agglomerating pre-Dryer for very fine grain sugar and use heat exchangers passing clean filtered air only.

Illustration shows Buell combined Drying and Cooling unit handling 18 tons white sugar per hour in a British Sugar Factory.

Also

BUELL-BÜTTNER ROTARY DRUM DRYERS FOR DRYING BEET SUGAR PULP

B6

CONTINUOUS BELT WEIGHER

for weighing whole beets or cossettes

Specially adapted for controlling the speed of cutting mills relative to weight for Continuous Diffusion Plants

Automatic and Sackfilling Weighing Machines

SPECIAL TYPES IN CONSTANT PRODUCTION for

- RAW SUGAR
- REFINED SUGAR
- and BEET PULP

RICHARD SIMON & SONS LTD.

PHOENIX WORKS, BASFORD, NOTTINGHAM

Telephone: 75136-7-8 *Telegrams:* "Balance, Nottingham"

CARY SUGAR CANE HARVESTER–CLEANER–LOADER

The Cary combination Harvester-Cleaner-Loader harvesting extremely recumbent 70 ton per acre cane and loading short lengths (15 in. or 22 in. lengths) into special side dump trailers. Capacity under Florida conditions 250-300 tons per day (cut, cleaned and loaded).

Manufactured by

CARY IRON WORKS

OPELOUSAS, LOUISIANA

(also manufacturers of Cane Trailers and Field Derricks)

Export Division

LOGAN PERKINS—SUGAR MACHINERY

International Trade Mart, New Orleans, U.S.A.

BASIC CALCULATIONS FOR THE CANE SUGAR FACTORY

By J. EISNER

(Technical Adviser, Booker Bros. McConnell & Co. Ltd.)

This book is intended for use by the men who work in sugar factories and are responsible for the day-to-day operation of plant and process, and who have not the time—or inclination—for studying voluminous textbooks. Of convenient size and style it will be the valued companion of all cane sugar men.

Price: **7s. 6d.** or **$1·00** U.S. post-free.

Obtainable only from *The International Sugar Journal Ltd.*, Central Chambers, The Broadway, London, W.5.

"Brasil Açucareiro"

OFFICIAL ORGAN *of the* BRAZILIAN INSTITUTE OF SUGAR & ALCOHOL
(INSTITUTO DO AÇÚCAR E DO ÁLCOOL)

A MONTHLY MAGAZINE containing complete news and specialized contributions on Brazilian and international sugar agriculture and industry.

Annual Subscription:

Brazil ..... Cr.$100.00
Foreign Countries ..... Cr.$150.00
Single Copies ..... Cr. $10.00
Back Copies ..... Cr. $15.00

Remittances must be made in the name of

INSTITUTO DO AÇÚCAR E DO ÁLCOOL
Praça 15 de Novembro, 42,
Rio de Janeiro,
BRASIL.
Caixa Postal 420.

THE SOUTH AFRICAN SUGAR JOURNAL

covering the

Sugar Industries of NATAL, ZULULAND, MOZAMBIQUE and EAST AFRICA

Since 1914

The *South African Sugar Journal* has presented planters and millers in the territories for which it caters with authoritative reviews of developments in all fields of sugar cane technology.

FREE SAMPLE COPY SENT ON REQUEST

Subscription and Advertising Rates available from

THE SOUTH AFRICAN SUGAR JOURNAL
P.O. Box 1209
London Assurance House, Smith Street, Durban, South Africa.
Telephone 25612

SUGAR NEWS

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE PHILIPPINE SUGAR INDUSTRY

Published by:
THE SUGAR NEWS PRESS INC.

FEATURES

Results of research and experiments in fields and mills, and other important developments in the Philippine sugar industry of interest both to technical men and laymen ; sugar production, prices, and market news and statistics ; write-ups on other important and allied industries in the Philippines, etc.

SUBSCRIPTION

$7.50 U.S. Currency, per annum, post free *for U.S.A. and its possessions*

$10.00 U.S. Currency, per annum, post free *for other foreign countries*

WRITE FOR A FREE SPECIMEN COPY AND FOR ADVERTISING RATES.

Publishing Office:
417 Dasmariñas, 316 Doña Salud Building, Manila, Philippines.

CUBA SUGAR YEAR BOOK

New Edition (Spanish-English containing **SUGAR CENSUS** corrected to date, informative data and alphabetical index of Sugar Mills, giving situation, ownership, year founded, nationality, characteristics, total employees, yield (%), total cane ground, production and export of sugar, molasses, syrups, alcohol, cane brandy, aguardiente, rum.

Also lands owned and leased, colonos, days grinding, record and maps of rainfall, price of sugar and value of crops. Maps of Cuba showing ports, landings, distances, railways, roads, air communications, telegraph, cable and telephone connexions. Graphs with cane and cane products data. Bonded warehouses, taxes, and legislative measures enacted touching the industry.

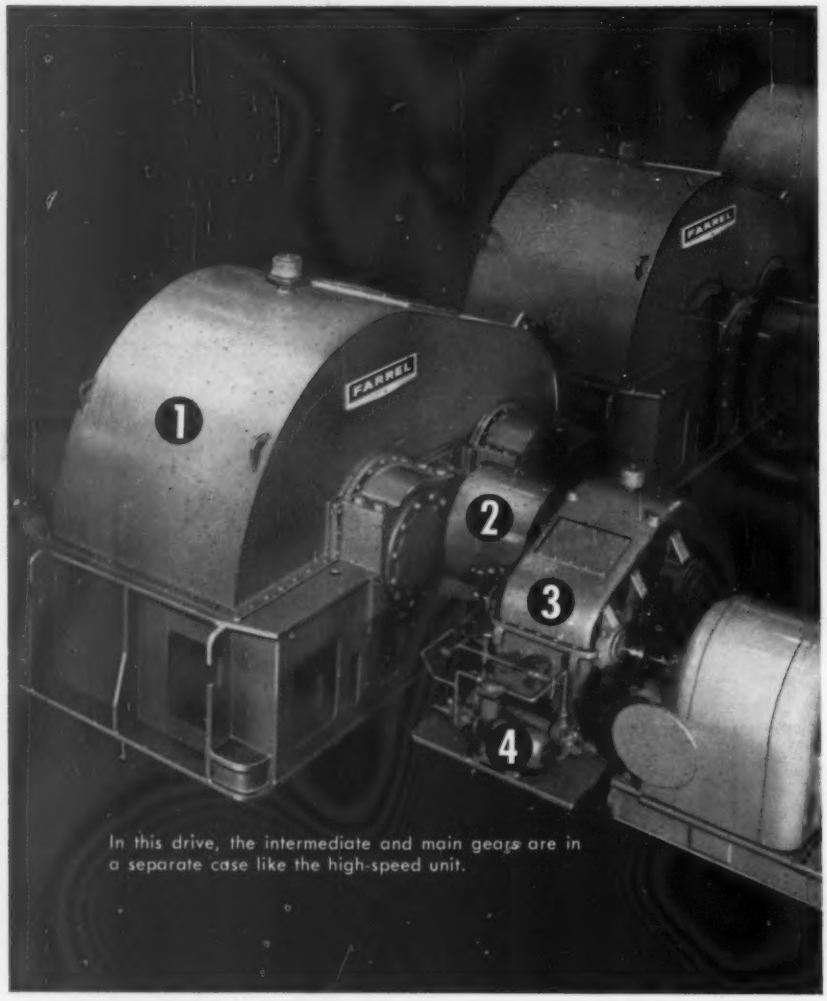
Directories with over 3000 names and addresses of official and private organizations, business firms, cane growers (Colonos), department heads, producers, shippers, etc.

Foreign Section : Sugar production in U.S. and other countries (beet and cane). Imports and distribution of sugar and by-products in U.S. World demand and consumption, quotas, distribution, transport, etc.

$5 post paid

Edited by :
CUBA ECONOMICA Y FINANCIERA
POST OFFICE BOX 2549, HAVANA, CUBA
Teleph. M-3148 Lonja 441-442

What makes this mill drive the most efficient you can buy?



In this drive, the intermediate and main gears are in a separate case like the high-speed unit.

1 Final gearing for adjacent mills completely independent, making possible more accurate alignment. Each unit is sealed, self-contained, and splash-lubricated from its own reservoir in the base of the case.

2 Air-actuated Wichita friction clutch between drives reduces shocks on high-speed reducer and turbine; serves as safety coupling in event of extreme overload; permits stopping mill quickly without shutting down turbine

3 First-reduction, high-speed gear units are ruggedly constructed and accurately machined from the highest quality materials to assure trouble-free operation.

4 Failure-proof lubrication system on high-speed reducer assures positive lubrication of gears and bearings over full range of operating speeds.

5 Heavy, forged-steel shafts mounted in self-aligning spherical roller bearings.

6 Gears are fabricated construction using heat-treated alloy steel rims. Teeth are precision-generated by the Farrel process and are lapped.

Farrel has built over 100 mill turbine drives!

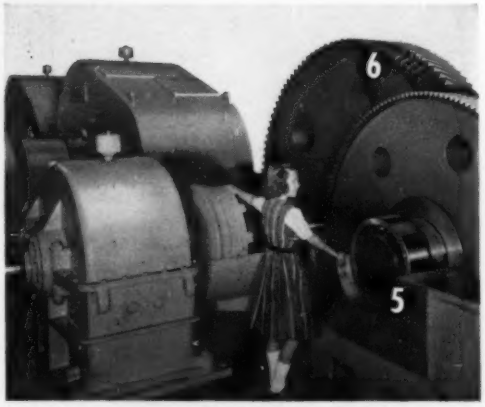
Farrel has designed and built more than 100 mill turbine drives for factories throughout the world. Ranging in turbine horsepower from 250 to 3600, these were for both new installations and for conversion of existing engine drives. Drawing on this experience, Farrel has many suggestions for modernizing the drive section of your tandem, each designed to increase milling capacity and efficiency.

Described here are some of the drive features pioneered by Farrel since 1950. For more information, send for a copy of bulletin 312.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT, U.S.A.
Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

FARREL

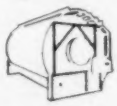
FB-1188



Farrel was the first to make fabricated gears for sugar-mill drives. With this type of construction, the gear-rim metal and heat treatment can be selected to give the teeth a load-carrying capacity up to 60% greater than cast-tooth gears.

EDFU SUGAR FACTORY, EGYPT, INSTALLS

3 RAPIDORR CLARIFIERS AND

4  OLIVER-CAMPBELL FILTERS

SUPPLIED BY: SANKI ENGINEERING CO. LTD.

CONTRACTOR: SHIN MITSUBISHI HEAVY INDUSTRIES, LTD., JAPAN

Dorr-Oliver's world-wide facilities assure maximum advantages in manufacturing cost, delivery and engineering service.

Dorr-Oliver Companies

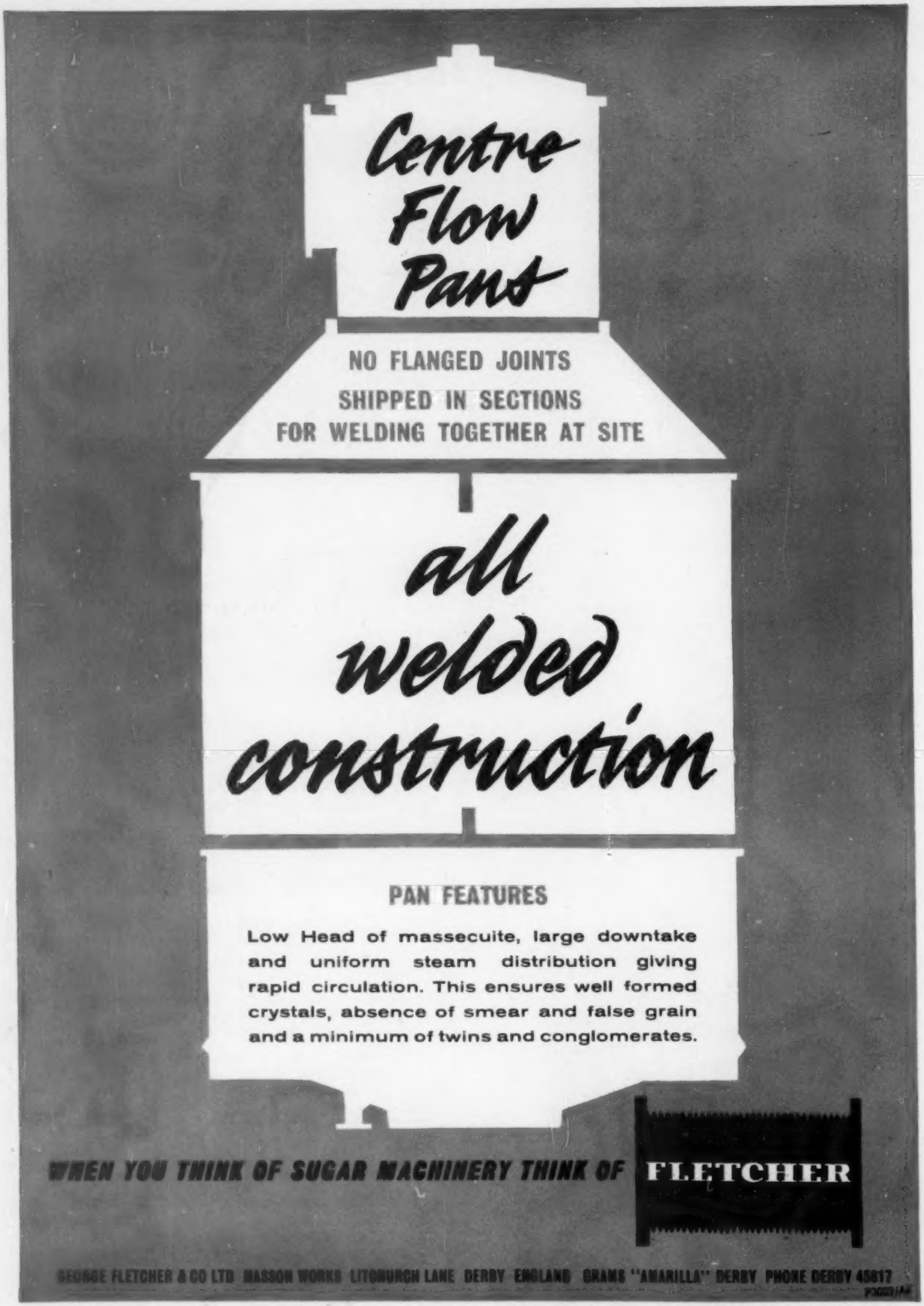
Australia Belgium, Canada, France, Germany, Great Britain, India, Italy, Netherlands, United States

Dorr-Oliver Representatives

Argentina, Brazil, British Guiana, Colombia, Costa Rica, Cuba, Hawaii, Jamaica, Japan, Mauritius, Mexico, Philippines, Portugal, Puerto Rico, Reunion, South Africa, Spain, Venezuela

DORR-OLIVER

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT


Centre Flow Pans
NO FLANGED JOINTS
SHIPPED IN SECTIONS
FOR WELDING TOGETHER AT SITE
all welded construction
PAN FEATURES
Low Head of massecuite, large downtake and uniform steam distribution giving rapid circulation. This ensures well formed crystals, absence of smear and false grain and a minimum of twins and conglomerates.
WHEN YOU THINK OF SUGAR MACHINERY THINK OF FLETCHER
GEORGE FLETCHER & CO LTD MASSON WORKS LITCHURCH LANE DERBY ENGLAND GRAMS "AMARILLA" DERBY PHONE DERBY 45817
P3020/A1

Printed by JOHN ROBERTS & SONS, Salford, Manchester; and published by the Proprietors, THE INTERNATIONAL SUGAR JOURNAL LTD., at Central Chambers, The Broadway, London, W.5. Entered at the New York Post Office as Second-Class Matter. Registered for transmission by Canadian Magazine Post.
PRINTED IN GREAT BRITAIN.